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ABSTRACT

This program guide identifies primary considerations in the organization, operation, and evaluation of a natural resources and forest ecology program. Program content is presented first. A curriculum framework specifies the exact course title, course number, levels of instruction, major course content, laboratory activities, special notes, major course concepts, and intended outcomes. Student performance standards are a resource list of job-specific competencies. The next section includes facility design criteria, suggested equipment and supplies, and information on safety. The section on implementation considers use of agriculture enhancement teaching-learning plans and the student learning guide and student organization participation. A section on professional considerations lists certification coverage for natural resources and forest ecology and professional organizations and support services. The final section lists the following instructional resources: a contact for information on a test item bank; teacher-recommended materials; sources of print and audiovisual materials and software; and Florida Educational Information Service services. Sample teaching-learning plans and a sample student learning guide are appended. A Career Merit Achievement Plan (Career MAP) displays the student performance standards required by the local education agency and documents students' level of achievement. (YLB)

ED359346

FLORIDA VOCATIONAL PROGRAM GUIDE FOR

NATURAL RESOURCES AND FOREST ECOLOGY

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Center for Instructional Development and Services
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FLORIDA VOCATIONAL PROGRAM GUIDE FOR

NATURAL RESOURCES AND FOREST ECOLOGY

State of Florida
Department of Education
Tallahassee, Florida
Betty Castor, Commissioner
Affirmative action/equal opportunity employer

Division of Vocational, Adult, and Community Education
Bureau of Vocational Program and Staff Development

July 1991

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INTRODUCTION

The *Florida Vocational Program Guide for Natural Resources and Forest Ecology* has been developed to provide information that will be useful to local administrators, regional coordinating councils, teachers, and others charged with the responsibility of offering vocational education in Natural Resources and Forest Ecology in school districts, area vocational-technical centers, and community colleges. The final planning, implementation, and evaluation of any educational program, however, must be done within the context of local conditions and local needs.

Many of the elements involved in the creation and maintenance of a vocational education program are generic to all subject areas; these issues are addressed in detail in the *Florida Vocational Program Implementation Guide* (FVPIG), **which should be considered an essential companion piece to this document.** The FVPIG contains information on the following:

- the importance of, as well as development strategies for, student learning guides
- information addressing concerns about program planning and implementation
- teacher requirements, updating, and certification
- program evaluation requirements
- in-depth program-component description

The *Florida Vocational Program Guide for Natural Resources and Forest Ecology* will serve to identify particular considerations in the organization, operation, and evaluation of this specific vocational education program.

This program guide helps ensure program equivalency. Natural Resources and Forest Ecology programs, if implemented throughout Florida according to the criteria described in this document, will help many citizens fill important roles in our state and national work force.

PROGRAM CONTENT AND STRUCTURE

The content of the Natural Resources and Forest Ecology program is based on occupational competencies and employability skills required for entry into the agricultural businesses and industries. The basic content of this program is described in the Florida Curriculum Framework and Student Performance Standards (SPSs). The Student Performance Standards were validated during a pilot program for the enhancement of vocational agriculture education by nine pilot sites during the 89-90 and 90-91 school years. This validation effort was sponsored by the DVACE.

The Natural Resources and Forest Ecology program includes both classroom and practical learning experiences that provide students with career information and job requirements for occupations in the fields of forestry and natural resources businesses and industries. This program provides students with an initial exposure to the skills and attitudes associated with careers in related agricultural occupations. The basic skills and attitudes related to these occupations are indicated as intended outcomes in the Curriculum Framework of this guide.

Job Titles

The purpose of the Natural Resources and Forest Ecology program is to prepare students for employment as forest and conservation worker; biological aide; soil conservation aide; wildlife conservation aide, park ranger; forester aide; forest worker; cruiser; forest conservation worker; fish hatchery worker; tree planter; and surveyor helper. Descriptions of the above job titles can be found in the *Dictionary of Occupational Titles*.

Curriculum Framework and Student Performance Standards

Program objectives and content should be consistent with the Vocational Education Program Courses Standards as approved by the Florida State Board of Education. Provided on the following pages are the Curriculum Framework and Student Performance Standards (SPS) for Natural Resources and Forest Ecology courses as listed in the official *Vocational Education Program Courses Standards* document. Since these SPSs are continually updated, you should check each year with your district's agribusiness and natural resources education supervisor and the regional program specialist for a current version.

CURRICULUM FRAMEWORK

FLORIDA DEPARTMENT OF EDUCATION

PROGRAM AREA: Agriculture

EFFECTIVE DATE: July 1991

PROGRAM TITLE: Natural Resources and Forest Ecology

CODE NUMBER: Secondary 8118200 Postsecondary

Florida CIP 0103.059901

SECONDARY SCHOOL CREDITS 3 COLLEGE CREDITS POSTSECONDARY ADULT VOCATIONAL CREDITS

APPLICABLE LEVEL(S): 7-9 9-12 Postsecondary Adult Vocational

Postsecondary Vocational X Other 10-12, 30, 31

CERTIFICATION COVERAGE:

VOC AGRI @4
FORESTRY #7
AGRI RES #7

AGRI @4
AGRICULTUR 1 2

I. MAJOR CONCEPTS/CONTENT: The purpose of this program is to prepare students for employment in positions in the agriculture industry as forest and conservation worker (79002513); biological aide (049.384-010); soil conservation aide (040.061-054); wildlife conservation aide, park ranger (169.167-042); forester aide (452.364-010); forest worker (452.687-010); cruiser (459.387-010); forest conservation worker (80002831); fish hatchery worker (446.684-010); tree planter (452.687-018); and surveyor helper (869.567-010); or to provide supplemental training for persons previously or currently employed in these occupations.

This program is one of the three Florida standard cores of agriculture competencies. Completers of this program will be prepared to enter advanced training and education in specialized fields of agriscience or agribusiness. They may also be employed as trainees or beginning workers in various agriscience- or agribusiness-related positions in certain businesses and industries.

The content includes, but is not limited to, instruction that prepares individuals for activities involving the conservation and/or improvement of forests and natural resources such as air, soil, water, land, fish, and wildlife for economic and recreational purposes. Subject matter also includes maintenance and operation of related equipment, as well as employability skills, mathematics, basic biological sciences, communications, and human-relations skills.

Listed below are the courses that this program comprises when offered at the secondary level:

8106810 Agriscience Foundations
8118210 Forest Ecosystems
8118220 Forest and Natural Resources

II. LABORATORY ACTIVITIES: Laboratory activities are an integral part of this program, including the safe use of mechanic hand tools, field hand tools, hand and power portable carpentry tools, soil and water sampling equipment, tractors and field equipment, and hand fire-control equipment.

III. SPECIAL NOTE: The FFA (secondary) and the National Postsecondary Agriculture Student Organization (postsecondary) are the appropriate vocational student organizations for providing leadership training experiences and for reinforcing specific vocational skills. When provided, these activities are considered an integral part of this instructional program.

Planned and supervised occupational activities must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, and (4) cooperative education.

Because of the production and marketing cycle of forestry and natural-resources industries, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

The cooperative method of instruction is appropriate for this program. Students can take the cooperative training either during or after completing the program. Whenever the cooperative method is offered, the following are required for each student: a training plan, signed by the student, teacher, and employer, which includes instructional objectives and a list of on-the-job and in-school learning experiences; a workstation reflecting equipment, skills, and tasks that are relevant to the occupation that the student has chosen as a career goal. The student must receive compensation for work performed.

The particular outcomes and student performance standards that the handicapped student must master to earn credit must be specified in the student's individual education plan (IEP). Additional credits may be earned when outcomes and standards are mastered, in accordance with the requirements indicated in subsequent IEPs. The job title for which the student is being trained must be designated in the IEP.

IV. INTENDED OUTCOMES: After successfully completing this program, the student will be able to:

01. Describe the socioeconomic role of agriculture.
02. Apply important scientific and technological principles to agribusiness and natural resources.
03. Practice agricultural safety.
04. Demonstrate the use of tools and equipment and describe the principles of agricultural mechanics.
05. Describe the principles of pest management for insects, diseases, and weeds.
06. Describe the principles of plant growth and reproduction.
07. Apply management skills and economic principles to agribusiness and natural resources.
08. Explain the basic functions of the marketing process in agriculture.
09. Demonstrate human-relations, communications, and leadership skills.
10. Describe the forestry, natural-resources, and environmental-protection industries.
11. Practice forestry and natural-resources safety.
12. Operate, maintain, and repair machinery, equipment, and facilities.
13. Identify land boundaries and perform basic surveying operations.
14. Read and interpret aerial photographs and maps.
15. Identify major ecosystems of Florida.
16. Assist in determining the quality and quantity of water resources.
17. Assist in managing plant growth and reproduction.
18. Identify volumes, products, and marketing techniques.
19. Assist in managing wildlife population growth and reproduction.
20. Assist in managing the urban forest.
21. Assist in controlling and using fire in forest and other lands.
22. Assist in managing forest pests.
23. Identify applicable local, state, and federal rules and regulations and assistance programs.
24. Apply multiuse principles to forest and other lands.
25. Identify technological advances in the industry.
26. Apply business-management skills and identify appropriate legal documents.
27. Demonstrate leadership, employability, communications, and human-relations skills.

STUDENT PERFORMANCE STANDARDS EFFECTIVE DATE: July 1991

PROGRAM AREA: Agriculture SECONDARY NUMBER: 8118200

PROGRAM TITLE: Natural Resources and Forest Ecology POSTSECONDARY NUMBER: _____

01.0 DESCRIBE THE SOCIOECONOMIC ROLE OF AGRICULTURE--The student will be able to:

01.01 Prepare an overview of the history of agriculture.
01.02 Discuss agricultural products and services important to the local, state, national, and global economy.
01.03 Investigate career opportunities in agriscience and identify which school activities would help one prepare for those careers.
01.04 Discuss agriculture's role in the interaction of population, food, and energy.

02.0 APPLY IMPORTANT SCIENTIFIC AND TECHNOLOGICAL PRINCIPLES TO AGRIBUSINESS AND NATURAL RESOURCES--The student will be able to:

02.01 Discuss the importance of scientific classification in agriculture.
02.02 Use the scientific methods to solve problems in agriculture.
02.03 Demonstrate the use of genetics, including probability applications, through an agricultural project/activity.
02.04 Analyze how recent technology is impacting agriscience.
02.05 Identify the components of an agricultural ecosystem and recognize the role of each.
02.06 Construct and analyze a diagram of a biological food chain common to Florida agriculture and natural resources.
02.07 Describe how water, carbon, nitrogen, oxygen, sulfur, and phosphorus are recycled naturally.
02.08 Evaluate soil profiles, land-capability classes, and soil-conservation practices.
02.09 List the components of Florida's fresh water systems (lakes, ground water, aquifer, sink holes, rivers, and swamps) and explain the importance of managing these resources.
02.10 Explain how increasing or decreasing the use of one natural resource may affect another resource.
02.11 Describe the causes and effects of air, water, and land pollution and identify ways to prevent pollution.
02.12 Explain the flow of energy from the sun, through agricultural systems (i.e., the common food pyramid), and back into the abiotic environment.
02.13 Recognize the environmental requirements necessary for a productive natural or man-made aquaculture system.
02.14 Apply principles of sound waste management to environmental problems common to agricultural systems.

03.0 PRACTICE AGRICULTURAL SAFETY--The student will be able to:

- 03.01 List the most common causes of agricultural accidents.
- 03.02 Discuss the importance of following proper safety precautions.
- 03.03 Demonstrate safety procedures in the classroom and laboratory.
- 03.04 Describe the importance of following the directions on chemical containers and in equipment operator manuals.
- 03.05 Recognize the proper procedures of basic first aid and cardiopulmonary resuscitation (CPR).
- 03.06 Demonstrate safe and effective use of laboratory equipment, instruments, and materials.

04.0 DEMONSTRATE THE USE OF TOOLS AND EQUIPMENT AND DESCRIBE THE PRINCIPLES OF AGRICULTURAL MECHANICS--The student will be able to:

- 04.01 Describe the importance of using the proper tools and equipment for the job.
- 04.02 Describe the principles of selected mechanical applications (e.g., levers, pulleys, hydraulics, internal combustion).
- 04.03 Demonstrate the ability to use an equipment manual.
- 04.04 Demonstrate the use of selected tools and equipment.
- 04.05 Service, maintain, and store tools, equipment, and supplies.

05.0 DESCRIBE THE PRINCIPLES OF PEST MANAGEMENT FOR INSECTS, DISEASES, AND WEEDS--The student will be able to:

- 05.01 Identify major types of pests and weed infestations.
- 05.02 Identify and select an appropriate control for each major type of pest, including the use of integrated pest management.
- 05.03 Describe symptoms of pesticide poisoning.
- 05.04 Extract pertinent information from a pesticide label.
- 05.05 Select, mix, and apply a nonrestricted chemical, according to the label and local, state, federal, and EPA regulations.
- 05.06 Clean and store pesticide application equipment, safety clothing, and safety equipment.
- 05.07 Identify the proper disposal of containers and residual pesticides.
- 05.08 Calibrate spray equipment; solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.

06.0 DESCRIBE THE PRINCIPLES OF PLANT GROWTH AND REPRODUCTION--The student will be able to:

- 06.01 Identify the raw materials and products of photosynthesis and respiration, the plant structures involved, and the environmental conditions necessary for each reaction.
- 06.02 Describe the functions of roots, stems, leaves, and flowers.
- 06.03 Demonstrate sexual and asexual plant propagation.

06.04 Demonstrate the effects of nitrogen, phosphorus, and potassium (N.P.K.) on plant growth.
06.05 Extract pertinent information from a fertilizer label.
06.06 Describe the short- and long-range impact of fertilizer on people and the environment.

07.0 APPLY MANAGEMENT SKILLS AND ECONOMIC PRINCIPLES TO AGRIBUSINESS AND NATURAL RESOURCES--The student will be able to:

07.01 Identify basic economic principles applicable to agribusiness.
07.02 Explain the importance of local, state, and federal regulations and required documentation affecting agriculture.
07.03 Describe the types of agribusiness by organizational structure.
07.04 Select and use computer applications appropriate to agribusiness.
07.05 Form one or more inferences or hypotheses from records summarized in tables, graphs, or pictures.
07.06 Keep and maintain supervised agricultural experience (SAE) records.
07.07 Interpret legal descriptions of land in Florida.

08.0 EXPLAIN THE BASIC FUNCTIONS OF THE MARKETING PROCESS IN AGRICULTURE--The student will be able to:

08.01 Describe key factors in marketing agricultural products.
08.02 Select agricultural products according to grades and standards.

09.0 DEMONSTRATE HUMAN-RELATIONS, COMMUNICATIONS, AND LEADERSHIP SKILLS--The student will be able to:

09.01 Demonstrate acceptable work habits and attitudes.
09.02 Follow oral and written directions with understanding; form questions that clarify directions, as needed.
09.03 Communicate effectively in oral, written, visual, and nonverbal modes; demonstrate effective telephone skills.
09.04 Recognize and demonstrate reflective listening skills and assertive communications skills in the workplace.
09.05 Conduct small, informal, and group meetings.
09.06 Demonstrate a knowledge of the opportunities for leadership development available through an appropriate student organization.

10.0 DESCRIBE THE FORESTRY, NATURAL-RESOURCES, AND ENVIRONMENTAL PROTECTION INDUSTRIES--The student will be able to:

10.01 Identify career opportunities in forestry, natural-resources, and environmental-protection industries and their educational requirements.
10.02 Describe the importance of forestry, natural resources and environmental protection.
10.03 Identify professional organizations and trade journals in the forestry, natural-resources, and environmental-protection industries.

11.0 PRACTICE FORESTRY AND NATURAL-RESOURCES SAFETY--The student will be able to:

11.01 Identify hazards of the workplace.
11.02 Observe color-coded warnings in work area and on equipment and machinery.
11.03 Demonstrate safety procedures.
11.04 Identify safe and effective fire-extinguishing techniques.
11.05 Apply minor first aid treatment and identify emergency procedures.
11.06 Safely handle and store flammable and non-restricted chemicals.
11.07 Select personal safety equipment and appropriate clothing.
11.08 Operate machinery and equipment according to safety recommendations of manufacturer.

12.0 OPERATE, MAINTAIN, AND REPAIR MACHINERY, EQUIPMENT, AND FACILITIES--The student will be able to:

12.01 Use the equipment-operator and repair manuals.
12.02 Service and maintain small gasoline engines.
12.03 Operate, service, and maintain tractors and equipment.
12.04 Maintain records of maintenance and repair of equipment and machinery.
12.05 Prepare equipment for storage.
12.06 Demonstrate proper use of shop and lab equipment.
12.07 Perform minor welding repairs using arc and oxygen-acetylene equipment.
12.08 Repair and maintain facilities.
12.09 Use two-way radio equipment.

13.0 IDENTIFY LAND BOUNDARIES AND PERFORM BASIC SURVEYING OPERATIONS--The student will be able to:

13.01 Make linear measurements of land.
13.02 Set up levels and perform basic surveying operations.
13.03 Mark boundaries and corners by using paint or by blazing.
13.04 Calculate area of measured land.
13.05 Plot land area using legal land description.

14.0 READ AND INTERPRET AERIAL PHOTOGRAPHS AND MAPS--The student will be able to:

14.01 Interpret the terms, symbols, and scales used on soil and topographic maps.
14.02 Use maps and aerial photographs for determining acreage.
14.03 Use aerial photographs to identify major timber types and land features.
14.04 Interpret legal descriptions for land in Florida.

15.0 IDENTIFY MAJOR ECOSYSTEMS OF FLORIDA--The student will be able to:

15.01 Identify common plant and animal species of major ecosystems.
15.02 Identify habitats of the most endangered plant and animal species in Florida.

16.0 ASSIST IN DETERMINING THE QUALITY AND QUANTITY OF WATER RESOURCES--The student will be able to:

16.01 Identify the hydrologic cycle and major uses for water.
16.02 Assist in identifying present and potential sources of water pollution in the local area.
16.03 Assist in determining the quality of a given sample of water.
16.04 Calculate the volume and surface area of ponds, lakes, and streams.
16.05 Assist in planning the improvements of waterways, ponds, stream banks, and shorelines.

17.0 ASSIST IN MANAGING PLANT GROWTH AND REPRODUCTION--The student will be able to:

17.01 Take soil samples representative of an area, correctly complete soil data forms, and submit them for laboratory analysis.
17.02 Test soil for acidity or alkalinity and recommend proper soil additives to correct the pH level.
17.03 Determine the appropriate conservation management practices for planting a particular area.
17.04 Determine land classes according to soil classification standards.
17.05 Select method of, and assist in, site preparation.
17.06 Care for seedling from nursery to planting.
17.07 Plant tree seedlings, using hand or mechanical planter.
17.08 Identify methods of production and assist in producing plants.
17.09 Explain the organic cycle occurring in nature.
17.10 Explain requirements for natural regeneration of plant species.
17.11 Maintain selected plants.

18.0 IDENTIFY VOLUMES, PRODUCTS, AND MARKETING TECHNIQUES--The student will be able to:

18.01 Identify the products made from trees and other natural resources and their value.
18.02 Select and mark trees to be removed in timber-stand improvement.
18.03 Conduct a simple cruise.
18.04 Calculate volume and value of timber.
18.05 Identify components of timber-sales contracts.
18.06 Identify methods of harvesting and erosion prevention.
18.07 Determine site quality and growth rate for a timber stand.

19.0 ASSIST IN MANAGING WILDLIFE POPULATION GROWTH AND REPRODUCTION--The student will be able to:

19.01 Identify private, state, and federal agencies that are involved in anirnal wildlife conservation.
19.02 Identify species of land and aquatic wildlife common to Florida and classify them as game, nongame, endangered, or threatened.
19.03 Describe the characteristics of wildlife population dynamics.
19.04 Conduct a population survey of a wildlife species.
19.05 Identify appropriate management practices for wildlife habitat.
19.06 Interpret wildlife, game, and fishing laws, rules, and regulations.
19.07 Identify pests, insects, and diseases of common wildlife species.

20.0 ASSIST IN MANAGING THE URBAN FOREST--The student will be able to:

20.01 Assist in properly planting/transplanting trees in the urban landscape.
20.02 Demonstrate proper tree pruning, trimming, and fertilization techniques.
20.03 Describe the procedure for an urban tree inventory.
20.04 Describe the basic requirements for a tree-protection ordinance.
20.05 Develop a vegetative plan for improving wildlife habitat in urban areas.

21.0 ASSIST IN CONTROLLING AND USING FIRE IN FOREST AND OTHER LANDS--The student will be able to:

21.01 Identify major causes of wildfire.
21.02 Assist in determining and correcting potential fire danger in forests and other lands.
21.03 Describe personal safety procedures for forest fire fighters.
21.04 Use swatter, rake, portable water pack, and shovel to fight fire directly and counter fire for indirect attack.
21.05 Explain uses of prescribed burning in forest and wildlife management.
21.06 Develop a plan for a prescribed burn, including desirable burning conditions, permits, map, and fire lines.
21.07 Identify the burning assistance that is available from the Division of Forestry.

22.0 ASSIST IN MANAGING FOREST PESTS--The student will be able to:

22.01 Identify common pests, insects, and diseases.
22.02 Assist with control of common pests.
22.03 Assist with chemical, mechanical, and other controls of weed species.

23.0 IDENTIFY APPLICABLE LOCAL, STATE, AND FEDERAL RULES AND REGULATIONS AND ASSISTANCE PROGRAMS--The student will be able to:

23.01 Identify applicable land-use and zoning regulations.

23.02 Identify agencies affecting land and wildlife utilization (e.g., DNR, DER, EPA).
23.03 Identify agencies regulating employee/employer (e.g., OSHA).

24.0 APPLY MULTIUSE PRINCIPLES TO FOREST AND OTHER LANDS--The student will be able to:

24.01 Identify types of ownership of land and ownership rights.
24.02 Identify legal responsibilities for private and public land owners when land is used by the public.
24.03 Identify different types of leases and their necessary components.
24.04 Prepare a complete inventory of the renewable natural resources for a given site.
24.05 Assist in preparing a multiple use plan for forests and other lands.
24.06 Demonstrate safe use and maintenance for common outdoor equipment, including firearms.
24.07 Interpret park/campground rules, regulations, and historical and natural features for park visitors.

25.0 IDENTIFY TECHNOLOGICAL ADVANCES IN THE INDUSTRY--The student will be able to:

25.01 Identify and use basic computer programs.
25.02 Identify satellite surveying operations and laser systems.
25.03 Identify satellite thermal infrared imagery.
25.04 Identify computer mapping systems and geographic-information systems.

26.0 APPLY BUSINESS-MANAGEMENT SKILLS AND IDENTIFY APPROPRIATE LEGAL DOCUMENTS--The student will be able to:

26.01 Complete basic business records.
26.02 Demonstrate use of banking procedures.
26.03 Identify personal/business liability and the use of liability insurance.
26.04 Identify applicable insurance requirements.
26.05 Identify applicable personal/business tax liability.
26.06 Complete basic personal/business tax liability forms.
26.07 Identify requirements of Greenbelt and Homestead taxation.
26.08 Interpret enterprise budgets and amortization tables.
26.09 Identify characteristics of legal instruments (i.e., contracts, deeds, and leases).
26.10 Complete supervised agricultural experience (SAE) records.

27.0 DEMONSTRATE LEADERSHIP, EMPLOYABILITY, COMMUNICATION, AND HUMAN-RELATIONS SKILLS--The student will be able to:

27.01 Conduct group meetings, using parliamentary procedure and public-speaking skills.

27.02 Identify acceptable work habits (ethics) and desired personal characteristics.
27.03 Demonstrate acceptable employee-hygiene habits.
27.04 Secure information about a job.
27.05 Complete a job application.
27.06 Demonstrate competence in job-interview techniques.
27.07 Demonstrate proper office procedures.
27.08 Demonstrate appropriate response to criticism from employer, supervisor, or other persons in the workplace.
27.09 Demonstrate how to appropriately make a career change.
27.10 Demonstrate knowledge of how to appropriately make a career change, including resigning from a job.

STUDENT PERFORMANCE STANDARDS EFFECTIVE DATE: July 1991

PROGRAM AREA: Agriculture COURSE CREDIT: 1

PROGRAM TITLE: Natural Resources and Forest Ecology PROGRAM NUMBER: 8118200

COURSE TITLE: Agriscience Foundations COURSE NUMBER: 8106810

COURSE DESCRIPTION:

This course was developed as a core and is designed to develop competencies in the areas of agricultural history; global importance of the industry; career opportunities; applied scientific and technological concepts; ecosystems; agricultural safety; principles of pest management; principles of plant growth; management principles; agricultural marketing; and human-relations skills.

01.0 DESCRIBE THE SOCIOECONOMIC ROLE OF AGRICULTURE--The student will be able to:

- 01.01 Prepare an overview of the history of agriculture.
- 01.02 Discuss agricultural products and services important to the local, state, national, and global economy.
- 01.03 Investigate career opportunities in agriscience and identify which school activities would help one prepare for those careers.
- 01.04 Discuss agriculture's role in the interaction of population, food, and energy.

02.0 APPLY IMPORTANT SCIENTIFIC AND TECHNOLOGICAL PRINCIPLES TO AGRIBUSINESS AND NATURAL RESOURCES--The student will be able to:

- 02.01 Discuss the importance of scientific classification in agriculture.
- 02.02 Use the scientific methods to solve problems in agriculture.
- 02.03 Demonstrate the use of genetics, including probability applications, through an agricultural project/activity.
- 02.04 Analyze how recent technology is impacting agriscience.
- 02.05 Identify the components of an agricultural ecosystem and recognize the role of each.
- 02.06 Construct and analyze a diagram of a biological food chain common to Florida agriculture and natural resources.
- 02.07 Describe how water, carbon, nitrogen, oxygen, sulfur, and phosphorus are recycled naturally.
- 02.08 Evaluate soil profiles, land-capability classes, and soil-conservation practices.

02.09 List the components of Florida's fresh water systems (lakes, ground water, aquifer, sinkholes, rivers, and swamps) and explain the importance of managing these resources.
02.10 Explain how increasing or decreasing the use of one natural resource may affect another resource.
02.11 Describe the causes and effects of air, water, and land pollution and identify ways to prevent pollution.
02.12 Explain the flow of energy from the sun, through agricultural systems (i.e., the common food pyramid), and back into the abiotic environment.
02.13 Recognize the environmental requirements necessary for a productive natural or man-made aquaculture system.
02.14 Apply principles of sound waste management to environmental problems common to agricultural systems.

03.0 PRACTICE AGRICULTURAL SAFETY--The student will be able to:

03.01 List the most common causes of agricultural accidents.
03.02 Discuss the importance of following proper safety precautions.
03.03 Demonstrate safety procedures in the classroom and laboratory.
03.04 Describe the importance of following the directions on chemical containers and in equipment operator manuals.
03.05 Recognize the proper procedures of basic first aid and cardiopulmonary resuscitation (CPR).
03.06 Demonstrate safe and effective use of laboratory equipment, instruments, and materials.

04.0 DEMONSTRATE THE USE OF TOOLS AND EQUIPMENT AND DESCRIBE THE PRINCIPLES OF AGRICULTURAL MECHANICS--The student will be able to:

04.01 Describe the importance of using the proper tools and equipment for the job.
04.02 Describe the principles of selected mechanical applications (e.g., levers, pulleys, hydraulics, internal combustion).
04.03 Demonstrate the ability to use an equipment manual.
04.04 Demonstrate the use of selected tools and equipment.
04.05 Service, maintain, and store tools, equipment, and supplies.

05.0 DESCRIBE THE PRINCIPLES OF PEST MANAGEMENT FOR INSECTS, DISEASES, AND WEEDS--The student will be able to:

05.01 Identify major types of pests and weed infestations.
05.02 Identify and select an appropriate control for each major type of pest, including the use of integrated pest management.
05.03 Describe symptoms of pesticide poisoning.
05.04 Extract pertinent information from a pesticide label.
05.05 Select, mix, and apply a nonrestricted chemical, according to the label and local, state, federal, and EPA regulations.

05.06 Clean and store pesticide application equipment, safety clothing, and safety equipment.
05.07 Identify the proper disposal of containers and residual pesticides.
05.08 Calibrate spray equipment; solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.

06.0 DESCRIBE THE PRINCIPLES OF PLANT GROWTH AND REPRODUCTION--The student will be able to:

06.01 Identify the raw materials and products of photosynthesis and respiration, the plant structures involved, and the environmental conditions necessary for each reaction.
06.02 Describe the functions of roots, stems, leaves, and flowers.
06.03 Demonstrate sexual and asexual plant propagation.
06.04 Demonstrate the effects of nitrogen, phosphorus, and potassium (N.P.K.) on plant growth.
06.05 Extract pertinent information from a fertilizer label.
06.06 Describe the short- and long-range impact of fertilizer on people and the environment.

07.0 APPLY MANAGEMENT SKILLS AND ECONOMIC PRINCIPLES TO AGRIBUSINESS AND NATURAL RESOURCES--The student will be able to:

07.01 Identify basic economic principles applicable to agribusiness.
07.02 Explain the importance of local, state, and federal regulations and required documentation affecting agriculture.
07.03 Describe the types of agribusiness by organizational structure.
07.04 Select and use computer applications appropriate to agribusiness.
07.05 Form one or more inferences or hypotheses from records summarized in tables, graphs, or pictures.
07.06 Keep and maintain supervised agricultural experience (SAE) records.
07.07 Interpret legal descriptions of land in Florida.

08.0 EXPLAIN THE BASIC FUNCTIONS OF THE MARKETING PROCESS IN AGRICULTURE--The student will be able to:

08.01 Describe key factors in marketing agricultural products.
08.02 Select agricultural products according to grades and standards.

09.0 DEMONSTRATE HUMAN-RELATIONS, COMMUNICATIONS, AND LEADERSHIP SKILLS--The student will be able to:

09.01 Demonstrate acceptable work habits and attitudes.
09.02 Follow oral and written directions with understanding; form questions that clarify directions, as needed.
09.03 Communicate effectively in oral, written, visual, and nonverbal modes; demonstrate effective telephone skills.

09.04 Recognize and demonstrate reflective listening skills and assertive communications skills in the workplace.
09.05 Conduct small, informal, and group meetings.
09.06 Demonstrate a knowledge of the opportunities for leadership development available through an appropriate student organization.

STUDENT PERFORMANCE STANDARDS EFFECTIVE DATE: July 1991

PROGRAM AREA: Agriculture COURSE CREDIT: 1

PROGRAM TITLE: Natural Resources and Forest Ecology PROGRAM NUMBER: 8118200

COURSE TITLE: Forest Ecosystems COURSE NUMBER: 8118210

COURSE DESCRIPTION:

This course is designed to develop competency in the areas of career identification; safety; operation and maintenance of tools and equipment; measure and calculation of land areas; surveying; aerial photography; map reading; water resources; soils and land classification; wood products; tree planting; forest pests; land use; computer applications; record keeping; and leadership skills.

10.0 DESCRIBE THE FORESTRY, NATURAL-RESOURCES, AND ENVIRONMENTAL-PROTECTION INDUSTRIES--The student will be able to:

- 10.01 Identify career opportunities in forestry, natural-resources, and environmental-protection industries and their educational requirements.
- 10.02 Describe the importance of forestry, natural resources and environmental protection.
- 10.03 Identify professional organizations and trade journals in forestry, natural-resources and environmental-protection industries.

11.0 PRACTICE FORESTRY AND NATURAL-RESOURCES SAFETY--The student will be able to:

- 11.01 Identify hazards of the workplace.
- 11.02 Observe color-coded warnings in work areas and on equipment and machinery.
- 11.03 Demonstrate safety procedures.
- 11.04 Identify safe and effective fire-extinguishing techniques.
- 11.05 Apply minor first aid treatment and identify emergency procedures.
- 11.06 Safely handle and store flammable and nonrestricted chemicals.
- 11.07 Select personal safety equipment and appropriate clothing.
- 11.08 Operate machinery and equipment according to safety recommendations of manufacturer.

12.0 OPERATE, MAINTAIN, AND REPAIR MACHINERY, EQUIPMENT, AND FACILITIES--The student will be able to:

- 12.01 Use the equipment operator and repair manuals.
- 12.02 Service and maintain small gasoline engines.

12.03 Operate, service, and maintain tractors and equipment.
12.06 Demonstrate proper use of shop and lab equipment.
12.07 Perform minor welding repairs using arc and oxygen-acetylene equipment.
12.09 Use two-way radio equipment.

13.0 IDENTIFY LAND BOUNDARIES AND SURVEYING--The student will be able to:

13.01 Make linear measurements of land.
13.02 Set up levels and perform basic surveying operations.
13.03 Mark boundaries and corners by using paint or by blazing.
13.04 Calculate area of measured land.
13.05 Plot land area using legal land description.

14.0 READ AND INTERPRET AERIAL PHOTOGRAPHS AND MAPS--The student will be able to:

14.01 Interpret the terms, symbols, and scales used on soil and topographic maps.
14.04 Interpret legal descriptions for land in Florida.

16.0 ASSIST IN DETERMINING THE QUALITY AND QUANTITY OF WATER RESOURCES--The student will be able to:

16.01 Identify the hydrologic cycle and major uses for water.
16.02 Assist in identifying present and potential sources of water pollution in local area.

17.0 ASSIST IN MANAGING PLANT GROWTH AND REPRODUCTION--The student will be able to:

17.01 Take soil samples representative of an area, correctly complete soil data forms, and submit them for laboratory analysis.
17.02 Test soil for acidity or alkalinity and recommend proper soil additives to correct the pH level.
17.03 Determine the appropriate conservation management practices for planting a particular area.
17.04 Determine land classes according to soil classification standards.
17.05 Select method of, and assist in, site preparation.
17.06 Care for seedling from nursery to planting.
17.07 Plant tree seedlings using hand or mechanical planter.

18.0 IDENTIFY VOLUMES, PRODUCTS, AND MARKETING TECHNIQUES--The student will be able to:

18.01 Identify the products made from trees and other natural resources and their value.
18.02 Select and mark trees to be removed in timber-stand improvement.

20.0 ASSIST IN MANAGING THE URBAN FOREST--The student will be able to:

20.01 Assist in properly planting/transplanting trees in the urban landscape.
20.02 Demonstrate proper tree pruning, trimming, and fertilization techniques.

21.0 ASSIST IN CONTROLLING AND USING FIRE IN FOREST AND OTHER LANDS--The student will be able to:

21.01 Identify major causes of wildfire.
21.02 Assist in determining and correcting potential fire danger on forests and other lands.

22.0 ASSIST IN MANAGING FOREST PESTS--The student will be able to:

22.01 Identify common pests, insects, and diseases.

23.0 IDENTIFY APPLICABLE LOCAL, STATE, AND FEDERAL RULES AND REGULATIONS AND ASSISTANCE PROGRAMS--The student will be able to:

23.01 Identify applicable land-use and zoning regulations.
23.02 Identify agencies affecting land and wildlife utilization (e.g., DNR, DER, EPA).
23.03 Identify agencies regulating employee/employer (e.g., OSHA).

24.0 APPLY MULTIUSE PRINCIPLES TO FOREST AND OTHER LANDS--The student will be able to:

24.01 Identify types of ownership of land and ownership rights.
24.02 Identify legal responsibilities for private and public land owners when land is used by the public.
24.03 Identify different types of leases and their necessary components.
24.04 Prepare and complete inventory of the renewable natural resources for a given site.
24.05 Assist in preparing a multiple use plan for forests and other lands.

25.0 IDENTIFY TECHNOLOGICAL ADVANCEMENTS IN THE INDUSTRY--The student will be able to:

25.01 Identify and use basic computer programs.

26.0 APPLY BUSINESS-MANAGEMENT SKILLS AND IDENTIFY APPROPRIATE LEGAL DOCUMENTS--The student will be able to:

26.01 Complete basic business records.
26.02 Demonstrate use of banking procedures.
26.03 Identify personal/business liability and use of liability insurance.
26.04 Identify applicable insurance requirements.
26.05 Identify applicable personal/business tax liability.

26.10 Complete supervised agricultural experience (SAE) records.

27.0 DEMONSTRATE LEADERSHIP, EMPLOYABILITY, COMMUNICATION, AND HUMAN-RELATIONS SKILLS--The student will be able to:

27.01 Conduct group meetings, using parliamentary procedure and public-speaking skills.
27.02 Identify acceptable work habits (ethics) and desired personal characteristics.
27.03 Demonstrate acceptable employee-hygiene habits.
27.04 Secure information about a job.
27.05 Complete a job application.
27.06 Demonstrate competence in job-interview techniques.

STUDENT PERFORMANCE STANDARDS | EFFECTIVE DATE: July 1991

PROGRAM AREA: Agriculture | COURSE CREDIT: 1

PROGRAM TITLE: Natural Resources and Forest Ecology | PROGRAM NUMBER: 8118200

COURSE TITLE: Forest and Natural Resources | COURSE NUMBER: 8118220

COURSE DESCRIPTION:

This course is designed to develop competency in the areas of safety; facility repair; aerial-photography interpretation; plant and animal identification; ecosystems; water quality; forest production; timber cruising; harvesting; site quality; regulations; conservation; wildlife and fish; urban forestry; prescribed burning; pest control; thermal imagery; tax laws; and leadership.

11.0 PRACTICE FORESTRY AND NATURAL RESOURCE SAFETY--The student will be able to:

- 11.05 Apply minor first aid treatment and identify emergency procedures.
- 11.06 Safely handle and store flammable and nonrestricted chemicals.
- 11.08 Operate machinery and equipment according to safety recommendations of manufacturer.

12.0 OPERATE, MAINTAIN, AND REPAIR MACHINERY, EQUIPMENT, AND FACILITIES--The student will be able to:

- 12.03 Operate, service, and maintain tractors and equipment.
- 12.04 Maintain records of maintenance and repair of equipment and machinery.
- 12.05 Prepare equipment for storage.
- 12.07 Perform minor welding repairs using arc and oxygen-acetylene equipment.
- 12.08 Repair and maintain facilities.

14.0 READ AND INTERPRET AERIAL PHOTOGRAPHS AND MAPS--The student will be able to:

- 14.02 Use maps and aerial photographs for determining acreage.
- 14.03 Use aerial photographs to identify major timber types and land features.

15.0 IDENTIFY MAJOR ECOSYSTEMS OF FLORIDA--The student will be able to:

15.01 Identify common plant and animal species of major ecosystems.
15.02 Identify habitats of the most endangered plant and animal species in Florida.

16.0 ASSIST IN DETERMINING THE QUALITY AND QUANTITY OF WATER RESOURCES--The student will be able to:

16.03 Assist in determining the quality of a given sample of water.
16.04 Calculate the volume and surface area of ponds, lakes, and streams.
16.05 Assist in planning the improvements of waterways, ponds, stream banks, and shorelines.

17.0 ASSIST IN MANAGING PLANT GROWTH AND REPRODUCTION--The student will be able to:

17.08 Identify methods of production and assist in producing plants.
17.09 Explain the organic cycle occurring in nature.
17.10 Explain requirements for natural regeneration of plant species.
17.11 Maintain selected plants.

18.0 IDENTIFY VOLUMES, PRODUCTS, AND MARKETING TECHNIQUES--The student will be able to:

18.03 Conduct a simple cruise.
18.04 Calculate volume and value of timber.
18.05 Identify components of timber-sales contracts.
18.06 Identify methods of harvesting and erosion prevention.
18.07 Determine site quality and growth rate for a timber stand.

19.0 ASSIST IN MANAGING WILDLIFE POPULATION GROWTH AND REPRODUCTION--The student will be able to:

19.01 Identify private, state, and federal agencies that are involved in animal wildlife conservation.
19.02 Identify species of land and aquatic wildlife common to Florida and classify them as game, nongame, endangered, or threatened.
19.03 Describe the characteristics of wildlife population dynamics.
19.04 Conduct a population survey of a wildlife species.
19.05 Identify appropriate management practices for wildlife habitat.
19.06 Interpret wildlife, game, and fishing laws, rules and regulations.
19.07 Identify pests, insects, and diseases of common wildlife species.

20.0 ASSIST IN MANAGING THE URBAN FOREST--The student will be able to:

20.03 Describe the procedure for an urban tree inventory.
20.04 Describe the basic requirements for a tree-protection ordinance.

20.05 Develop a vegetative plan for improving wildlife habitat in urban areas.

21.0 ASSIST IN CONTROLLING AND USING FIRE IN FOREST AND OTHER LANDS--The student will be able to:

21.03 Describe personal safety procedures for forest fire fighters.
21.04 Use swatter, rake, portable water pack, and shovel to fight fire directly and counter fire for indirect attack.
21.05 Explain uses of prescribed burning in forest and wildlife management.
21.06 Develop a plan for a prescribed burn, including desirable burning conditions, permits, map, and fire lines.
21.07 Identify burning assistance available from Division of Forestry.

22.0 ASSIST IN MANAGING FOREST PESTS--The student will be able to:

22.01 Identify common pests, insects, and diseases.
22.02 Assist with control of common pests.
22.03 Assist with chemical, mechanical, and other controls of weed species.

23.0 IDENTIFY APPLICABLE LOCAL, STATE, AND FEDERAL RULES AND REGULATIONS AND ASSISTANCE PROGRAMS--The student will be able to:

23.01 Identify applicable land-use and zoning regulations.
23.02 Identify agencies affecting land and wildlife utilization (e.g., DNR, DER, EPA).
23.03 Identify agencies regulating employee/employer (e.g., OSHA).

24.0 APPLY MULTIUSE PRINCIPLES TO FOREST AND OTHER LANDS--The student will be able to:

24.06 Demonstrate safe use and maintenance for common outdoor equipment, including firearms.
24.07 Interpret park/campground rules, regulations, and historical and natural features for park visitors.

25.0 IDENTIFY TECHNOLOGICAL ADVANCES IN THE INDUSTRY--The student will be able to:

25.02 Identify satellite surveying operations and laser systems.
25.03 Identify satellite thermal infrared imagery.
25.04 Identify computer mapping systems and geographic-information systems.

26.0 APPLY BUSINESS MANAGEMENT SKILLS AND IDENTIFY APPROPRIATE LEGAL DOCUMENTS--The student will be able to:

26.06 Complete basic personal/business tax liability forms.
26.07 Identify requirements of Greenbelt and Homestead taxation.
26.08 Interpret enterprise budgets and amortization tables.

26.09 Identify characteristics of legal instruments; (i.e., count, deeds, and leases).
26.10 Complete supervised agricultural experience (SAE) records.

27.0 DEMONSTRATE LEADERSHIP, EMPLOYABILITY, COMMUNICATION, AND HUMAN-RELATIONS SKILLS--The student will be able to:

27.07 Demonstrate proper office procedures.
27.08 Demonstrate appropriate response to criticism from employer, supervisor, or other persons in the workplace.
27.09 Demonstrate how to appropriately make a career change.
27.10 Demonstrate knowledge of how to appropriately make a career change, including resigning from a job.

FACILITIES

Design Criteria

Listed below are the minimum, normal, and maximum space requirements for Natural Resources and Forest Ecology instructional programs according to the **Rules of the Florida State Board of Education (Florida Administrative Code), Ch. 6A-2.**

DEDICATED SPACE
(in square feet)

	Per Student			Total (Based on 20 students)		
	Min.	Norm.	Max.	Min.	Norm.	Max.
Forestry Laboratory	70	74	77	1400	1480	1540
A-7 Classroom Instruction				500	525	550
I-3 Lockers, Toilets, and Showers				140	150	160
M-1 Reference				190	200	210
P-1 Storage, Flammable				70	75	80
P-8 Storage, Material				165	175	185
S-5 Storage, Tool				165	175	185
Q-9 Storage, Machinery				1000	1100	1200
Required Program Space				3630	3880	4110

Shop and Laboratory

Classroom/laboratory areas should be designed to accommodate workstations and equipment for Natural Resources and Forest Ecology. Land laboratories may also be appropriate.

Suggested Equipment and Supplies

To provide instruction to meet the needs of future farm operators and workers in agribusiness and industry, adequate equipment, tools, and reference materials are necessary. Instructional programs will vary from one school to another. This fact makes it almost impossible to publish a basic list of equipment that will be adequate for all situations. Several factors influence the recommendation for tools and equipment necessary for instruction, including: (1) the number of students, (2) the available space, (3) the local budget, and (4) the objectives.

Equipment

accessory lights
adding machine
aerial photographs
air compressor (large)
air tools
animal cages, feeding and watering
animal ID and electronic tracking equipment
anvil
aquarium and accessories
arc welder and accessories
assorted animal traps
assorted containers (metal and plastic)
assortment of naval stores equipment
assortment of outdoor sports equipment
assortment of soil digging and working devices
audiovisual stand
back-pack pump
band saw
bark gauge
basic mechanic hand and power tools
battery charger
battery pack
blackout curtains
boat, motor, and trailer
bookcases
bookcases for reference books
booster cables
box blade
bush hook
camera (35mm)
canoe
carpentry hand and power tools
catching, handling, preserving, and display equipment
chains and binders
chainsaw and related equipment
chairs (20)
chemical safety protective devices and equipment
clinometer
clipboards
clippers
color monitors
commercial software
compass
compressed air
computer and monitors
copy machine
council rake and flap
crosscut saw
depthometer (electronic)
desks (20)

diameter tape
disc harrow
display cabinet
dot grids
double axle trailer
drawing instruments
drill press and portable drill
drip torch fire pot
electrical hand and power tools
electricity
engine test equipment (coolant, battery, etc.)
extension cords
eye wash shower (with hot and cold water)
FFA organization paraphernalia
file cabinet
filmstrip reviewer
fire extinguishers
flammable and toxic materials storage
first-aid kits
floor jacks and safety stands
food plot equipment
four-wheel-drive utility truck
gas laminator
gas-powered trimmer with brush blade
gas welder and accessories
hand calculators
hand lens
hand seeder
hard and soft soldering kit
heavy-duty rotary mower
heavy-duty weatherproof extension cords
herbicide-applicator guns and injectors
high-pressure washer
hip boots
hoes, rakes, axes, etc. (hand tools)
hydraulic press
increment borer
incubator, hatchet, and brooder
insect equipment
jacob staff
large table for reference work
lawn maintenance equipment
letter-quality printer
logger's tape
long-reach stapler
lubrication and service equipment
machetes and axes
macrolens (closeup)
magazine rack
maps
marking equipment
masonry hand and power tools
metal tool storage boxes
metal chop saw
metal storage building
metalworking hand and power tools
microscope
mig welder
moisture tester
notebook rack
overhead projector
oxygen test equipment
paint guns
paint-marking guns
painting hand and power tools
peavys and cant hook
pedestal grinder
personal protective equipment
pH kits
pH meter
phone
planimeter
plant ID specimen kits
portable air compressor
portable grinder
portable hand truck
portable toilets
portable water cooler
portable water pump and tank
power wrench
prism
psychrometer
pulsa air cutter
radial saw
recorder
relaskop
safety goggles
sand plaster
sanitizing equipment
scales (balance)
scalper
screen
seed germinator

sein (100-foot, 2-inch mesh)
shop vacuum
slide projectors (2)
slide reviewer
slide sets, filmstrips, videos, models, charts
small gas engines and stand
small gas engine hand and power tools
soil augers and test equipment
soil temperature meter
soil texture kits
speaker's lectern
steam cleaner
steroscope
stool
stopwatches
storage cabinets
storage cabinets for audiovisual equipment
surveying instruments and accessories
synchronization equipment
synchronization cords
table saw
tape recorder
teacher's desks
teacher's chairs
textbook (non-state-adopted)
three point hitch spreader
three hole, heavy-duty paper punch
tire changer
tool and equipment storage cabinets
tractor sprayer
tractor (medium size)
tree planter
tree sacks and planting bar
two-ton chain hoist
two-way radio
typewriter
typewriter table
utility trailer
video camera
vises and clamps (for metal & woodwork)
wash sink
water pollution detection kit
water safety devices
water-sampling kit
weather station
welding helmets
welding stations
wheelbarrow
wood lathe
work aprons and other personal protective equipment
workstations
zoom lens (70-210)
zoom lens (30-70)

Classroom Supplies

Classroom resources, including equipment and supplies, should be provided and utilized to enable the instruction to meet program objectives.

The equipment and supplies listed below are for properly equipping a class of 20 students.

acetate (for transparencies)
adding machine
blackout curtains
cassettes
classroom tables (30" x 60")
file folders and labels
filmstrip previewer
filmstrip projector
floppy diskettes
four drawer file cabinet
glass-front display cabinet
grease pencils or transparency pens
legal size, four drawer bulletin files with dividers and inserts
letter size, four drawer bulletin files
line printer paper
line printer ribbons
magazine rack
microcomputer with monitor, CD Rom drive, printer, and modem
microcomputer printer paper
microcomputer printer ribbons
notebook rack
overhead projector
paper clips
paper towels
pencil sharpener
photocopy paper
postal scales
projection tables
projection screen (70" x 70")
rubber bands
rulers
scissors
slide previewer
slide projector with time and synchronizer
speaker's lectern
storage cabinets (36" x 21" x 78")
storage cabinets for transparencies
storage cabinets for slides and filmstrips
straight chairs
swivel chairs
tape and tape dispenser
tape recorder
teacher's desk
three-hole paper punch
thumb tacks
two-person work and study tables
typewriter
typewriter table
VCR/Monitor/CamCorder
VCR tape

Safety

Although no specific safety regulations have been mandated for Natural Resources and Forest Ecology programs, it is suggested that strict adherence to the general standards contained in the Florida Department of Education *Educational Facilities: Public Schools & Community Colleges* **Rules of Florida State Board of Education (Administrative Code), Ch. 6A-2 Rules** be practiced (e.g., first-aid kits in classrooms, adequate fire extinguishers, fire evacuation plan). In addition, since working with livestock, machinery, and other agriculture-related facilities is an integral part of this program, special efforts must be made to insure student safety and well being.

S.B.E. Rule 6A-2.097: Safety devices in shops, laboratories, and other process areas:

(1) Use of personal protection devices and other protective equipment is required when persons are exposed to the following:
   (a) arc welding, heavy gas cutting, scarfing
   (b) spot welding, brazing, or cutting
   (c) machining of any materials causing flying chips
   (d) injurious radiations, dusts, fumes, gases, vapor mists
   (e) sledging, hammering, chipping, scaling, drilling, grinding, chiseling, wire brushing, and caulking operations where flying objects or particles may strike the body
   (f) chemicals, acids, caustics, and molten metals.

(2) Personal protection devices which come in contact with the skin shall be sanitized after each use.

(3) Clothing, jewelry, and personal grooming of personnel in shops and labs shall not constitute a hazard.

(4) Individual equipment power shut-off, within reach of the operator, shall be provided for all working machinery. Each individual machine shall be equipped with an approved electromagnetic starter switch.

(5) No safeguard, safety appliance, or safety device guarding a machine or machine part shall be removed or made ineffective except when the machine is stopped and for the purpose of immediate cleaning, repairing, or adjusting. Upon completion of repairing, cleaning, or adjusting, such guard, appliance, or device shall immediately be replaced. Any shop or laboratory tool or equipment found to be unsafe shall be red-tagged and removed from service until the condition is corrected.

(6) The floors in areas where machines are used shall be kept free from waste, grease, and obstructions.

(7) Welding operations shall be located in a shielded area, and the area shall be free of combustible material and persons not wearing protective devices. Fume removal and venting to the exterior shall be provided.

(8) Areas where toxic fumes are produced shall be properly vented to the outside.
(9) Flammable fumes or dust produced in a student-occupied facility shall be mechanically exhausted to the outside with approved explosion-proof, motor-driven equipment of sufficient capacity to effectively remove fumes or dust and with filters in place.
(10) Each space equipped with unprotected gas valves accessible to students shall have an approved master cut-off readily accessible to the instructor.
(11) Each shop or lab equipped with electrically powered machinery accessible to students shall have one (1) or more conspicuously color-coded emergency disconnect switches at convenient locations throughout the space. Ordinary office machines, domestic sewing machines, and other such nonhazardous machines are not included in this requirement.
(12) Kilns shall be properly shielded from combustibles, combustible surfaces and personnel, and shall not be located in the path of or adjacent to any means of egress, or exposed to unauthorized persons.
(13) Automotive, body and frame repair areas requiring welding and cutting shall be separated from engine overhaul and related fuel handling activities.
(14) A tire cage shall be provided when pressurizing tires on split rims.
(15) Vehicle lifts shall be provided with a mechanical safety lock.
(16) Piping and working machinery shall be identified as follows:
    (a) Piping systems, except domestic hot and cold water, shall be visibly identified by legend, flow arrows and color coding in accordance with ANSI A13.1, American National Standard Scheme for Identification of Piping Systems, 1981 (see Rule 6A-2.050, FAC). Purchased, preprinted pipe markers meeting the above requirements and applied per manufacturer's instructions are acceptable. Field stenciling, when used, may delete color coding when legend clearly identifies pipe contents and flow arrows are included.
    (b) Working machinery and component parts shall be safety color-coded per ANSI Z53.1, American National Standard Safety Color Code for Marking Physical Hazards, 1979 (see Rule 6A-2.050, FAC).
(17) The safety color-coded chart shall be posted in a conspicuous place available to employees and students.
(18) Hazardous work and storage areas shall be identified by appropriate caution signs.
(19) All equipment designed to be permanently mounted shall be securely fastened to its supporting surface.
(20) Safety-zone lines shall be used on the floor area surrounding working machinery.
(21) Fume hoods shall be provided and kept in proper operating condition. Operations where flammable gas, toxic vapors, or noxious odors are given off shall be performed in fume hoods specifically designed for the intended use.
(22) Safety equipment such as showers and floor drains, eye wash, fire blankets, and proper extinguishing equipment shall be provided in areas where dangerous chemicals are used by students, and shall be properly installed and maintained.

PROGRAM IMPLEMENTATION

Agriculture Enhancement Teaching-Learning Plans

Teaching-learning plans are designed for teacher use in managing instruction. Through the pilot project for the enhancement of vocational agriculture education, teaching-learning plans were developed for each student performance standard in this program. These plans include the appropriate Intended Outcome and Student Performance Standard (SPS); the enabling objectives that clarify what students will know or be able to do; the equipment, tools, and materials needed to teach the SPS, suggested references and texts: teaching and learning activities for the classroom and the laboratory; and three sample test items. These materials are available through the occupational program specialist at DVACE. A sample teaching-learning plan is included in Appendix A.

Student Learning Guide

A student learning guide provides students with directions to help them manage their own learning. Tasks are broken down into steps, and resources as well as self-checks are provided.

A sample student learning guide is provided in Appendix B as an example for you to use when developing or adapting a set of learning guides or modules. This sample guide presents the major components of a competency-based student learning guide. For further information see the *Florida Vocational Program Implementation Guide*.

Student Organization Participation

The vocational student organization associated with the Natural Resources and Forestry Ecology program is FFA. This organization is cocurricular and is considered an integral part of the instructional program.

Refer to the *Florida Vocational Program Implementation Guide* for more information.

PROFESSIONAL CONSIDERATIONS

Teacher Certification

Listed below are the certification coverages included in the current Course Code Directory for Natural Resources and Forest Ecology:

VOC AGRI@4; AGRI @4; AGRI/RES #7; AGRICULTUR 1 2; FORESTRY #7

Professional Organizations and Support Services

Abraham Baldwin Agriculture College
ABAC Station
Tifton, GA 31793

Commissioner of Agriculture
Florida Department of Agriculture
3125 Doyle Conner Blvd.
Tallahassee, FL 32301

Department of Natural Resouces
Agricultural and Extension Educaiton
305 Rolfs Hall
University of Florida
Gainesville, FL 32611

Division of Vocational, Adult, and Community Education
Florida Department of Education
Florida Education Center
Tallahassee, FL 32399

Florida A & M University
M. L. King, Jr. Boulevard
Tallahassee, FL 32307

Florida Agricultural Statistics Service
University of Florida
Gainesville, FL 32611

Florida Association of Conservation Districts
P.O. Box 1269
Gainesville, FL 32602

Florida Association, FFA
Florida Education Center
Tallahassee, FL 32399

Florida Council of Farmer Cooperatives
P.O. Box 730
Gainesville, FL 32602

Florida Farm Bureau Federation
P.O. Box 730
Gainesville, FL 32602

Florida FFA Foundation
150 3rd St. S.W.
First Florida Bank Bldg.
Winterhaven, FL 33880

Florida Forestry Association
P.O. Box 1696
Tallahassee, FL 32302

Florida Irrigation Society
P.O. Box 1071
Apopka, FL 32703

Florida Quarter Horse Association
P.O. Box 756
Nokomis, FL 33555

Florida Vocational Agriculture Teachers Association
(address rotates with officers)

INSTRUCTIONAL RESOURCES

Listed on this and the following pages are teacher-recommended materials for teaching Natural Resources and Forest Ecology. If you are interested in obtaining any of the materials listed, refer to the section on sources of Print and Audiovisual Materials and Software or the list of Professional Organizations for complete addresses.

Teacher-Recommended Materials

PRINT

Author	Title	Publisher	Year
AAVIM	*Applying Pesticides*	AAVIM	1980
AAVIM	*Electrical Wiring, 5th ed.*	AAVIM	1990
AAVIM	*Safe Tractor Operation & Daily Care*	AAVIM	1981
----	*AgEd Network*	Agridata Resources Inc. (on-line data-base)	nd
Barnard, Edward & Dixon, Wayne	*Insects & Diseases*	FL Division of Forestry	1983
Briggs & Stratton	*Service & Repair Instruction Manual*	Local Authorized Service Dealer	current
Brown, R., Hanlon, E. A. & Herbert, J.	*Land Judging & Homesite Evaluation in Florida Cir. #242-G*	IFAS	current

Camp, Wm. G. & Daugherty, Thomas B.	*Managing Our Natural Resources*	Delmar	1988
Cooper, Elmer	*Agricultural Mechanics: Fundamentals & Applications*	Delmar	1987
-----	*Agriscience Fundamentals & Applications*	Delmar	1990
Florida Division of Forestry	*Introduction to Forestry in Florida*	PAEC	nd
Gaylor, Harry P.	*Wildfires. Prevention & Control*	Prentice Hall	1974
IMS Cornell	*Topographic Map and Compass Use*	IMS Cornell	current
Jobes, Raleigh & Syewart, Jim	*Farm & Ranch Business Management*	Deere & Co.	1985
Kjellstorm, Bjorn	*Be Expert with Map & Compass*	Macmillan	1976
Morgan, Joseph M., Morgan, Michael D., & Wiersma, J.	*Introduction to Environmental Science*	W. H. Freeman	1980
National FFA Organization	*Official Manual*	FFA	1990

Audio-Visuals

AAVIM	*Aquaculture: Farming the Waters*	AAVIM	1990
Dow Elanco	*Groundwater Video*	Highest Profit Program	nd
Monsanto	*Pesticide Registration. What It Is. How It Works.*	Highest Profit Program	nd
Rhone Poulenc	*Playing It Safe With Agricultural Chemicals*	Highest Profit Program	nd

Sources of Print and Audiovisual Materials and Software

Listed on the following pages are sample material sources that are available for Natural Resources and Forest Ecology. Additional resources may be available from other sources including professional and trade organizations. You are encouraged to see catalogs from these firms so that you become familiar with materials available.

	Print	Audiovisual	Software
Abraham Baldwin Agricultural College ABAC Station Tifton, GA 31793	X	--	--
Agency for Instructional Technology (AIT) Box A Bloomington, IN 47402-0120	X	X	X
Agridata Resources, Inc. 330 E. Kilbourn Ave. Milwaukee, WI 53202	X	--	--
American Association for Vocational Instructional Materials 745 Gaines School Road Athens, GA 30605	X	X	--

	Print	Audiovisual	Software
American Forestry Association P.O. Box 2000 745 Gaines School Road Athens, GA 30605	X	--	--
American Society of Agricultural Engineers 2950 Niles Road Saint Joseph, MI 49085-9659	X	--	--
American Vocational Association (AVA) Agricultural Education Division 1410 King Street Alexandria, VA 22314	X	--	--
Center for Occupational Research and Development (CORD) 601 C Air Lake Drive Waco, TX 76710	X	X	--
College of Agriculture University of Florida Gainesville, FL 32611	X	--	X
Conservation Foundation 1250 24th St., NW Washington, DC 20037	X	X	--
Cornell University Instructional Materials Service Dept. of Education Academic I, Cornell Ithaca, NY 14853	X	X	--
The Council P. O. Box 15035 Alexandria, VA 22309-0035	X	--	--
Delmar Publishing, Inc. 2 Computer Dr., West Albany, NY 12212-5015	X	--	--
Department of Natural Resources Agricultural and Extension Education 305 Rolfs Hall University of Florida Gainesville, FL 32611	X	--	--

	Print	Audiovisual	Software
Division of Forestry Florida Department of Agriculture 3125 Doyle Conner Boulevard Tallahassee, FL 32301	X	--	--
Division of Vocational, Adult, and Community Education Florida Department of Education Florida Education Center Tallahassee, FL 32399	X	--	--
FFA Supply Service P. O. Box 15159 Alexandria, VA 22309-0035	X	--	--
Florida A & M University M.L. King, Jr. Boulevard Tallahassee, FL 32307	X	--	--
Florida Agricultural Statistics Service University of Florida Gainesville, FL 32611	X	--	--
Florida Association, FFA Florida Education Center Tallahassee, FL 32399	X	--	--
Florida Association of Conservation Districts P. O. Box 1269 Gainesville, FL 32602	X	--	--
Florida Council of Farmer Cooperatives P. O. Box 730 Gainesville, FL 32602	X	--	--
Florida Department of Environmental Regulation 2600 Blair Stone Road Tallahassee, FL 32399-2400	X	--	--

	Print	Audiovisual	Software
Florida Department of Natural Resources Marjory Stoneman Douglas Building 3900 Commonwealth Boulevard Tallahassee, FL 32303	X	--	--
Florida Farm Bureau Federation P. O. Box 730 Gainesville, FL 32602	X	--	--
Florida FFA Foundation 150 3rd Street, S.W. First Florida Bank Building Winterhaven, FL 33880	X	--	--
Florida Forestry Assocaiation P. O. Box 1696 Tallahassee, FL 32302	X	--	---
Florida Game and Fresh Water Fish Commission Farris Bryant Building Tallahassee, FL 32301	X	--	--
Florida Irrigation Society P. O. Box 1071 Apopka, FL 32703	X	--	--
Florida Quarter Horse Association P. O. Box 756 Nokomis, FL 33555	X	--	--
Florida State University Center for Instructional Development and Services (CIDS) 2003 Apalachee Parkway Tallahassee, FL 32301	X	X	--
Future Farmers of America National FFA Supply Service P. O. Box 15159 Alexandria, VA 22309	X	--	--

	Print	Audiovisual	Software
Highest Profit Program P. O. Box 363 Brookfield, WI 53008-9981	X	--	--
Hobar Publications 1234 Tiller Lane St. Paul, MN 55112	X	X	X
Instructional Materials Lab Ohio State University 842 W. Goodale Boulevard Columbus, OH 43212	X	--	--
Instructional Materials Service Agricultural and Extension Education 305 Rolfs Hall University of Florida Gainesville, FL 32611	X	X	--
Instructional Materials Services Texas A & M University FE Box 2588 College Station, TX 77843-2588	X	X	X
Interstate Printers and Publishers 19 North Jackson Street Danville, IL 61832	X	--	--
John Deere Company 1400 Third Ave Moline, IL 61265	X	--	--
Macmillan Publishing Co. Front and Brown Sts. Riverside, NJ 08075	X	--	--
Mid-America Vocational Curriculum Consortium 1500 West Seventh Avenue Stillwater, OK 74074	X	X	X
Minnesota Curriculum Services Center Capitol View Center 70 County Rd. B-2 W Little Canada, MN 55117-1402	X	--	--

	Print	Audiovisual	Software
Mississippi State University MS Cooperative Extension Service Box 5446 Mississippi State, MS 39762	X	--	--
Modern Talking Picture Service 5000 Park Street, North St. Petersburg, FL 33709	--	X	--
National Association of Conservation Districts (NACD) 509 Capitol Ct., N. E. Washington, DC 20002	X	--	--
National Audubon Society 950 Third Avenue New York, NY 10022	X	X	--
National Wildlife Federation 1412 16th Street, N. W. Washington, DC 20036	X	--	--
National Geographic Society Educational Services Department 81 17th and M Streets, N. W. Washington, DC 20036	X	X	--
National Rifle Association 1600 Rhode Island Avenue, N. W. Washington, DC 20036	X	--	--
National Parks and Conservation Association 1015 31st Street, N. W. Washington, DC 20009	X	--	--
NNCCVTE-Southeast Region Research and Curriculum Unit Drawer DX Mississippi State, MS 39762	X	--	--
Northwest Florida Water Management District Route 3, Box 64 Havana, FL 32333	X	X	--

	Print	Audiovisual	Software
Oklahoma State Department of Vo-Tech Educaiton 1500 West Seventh Avenue Stillwater, OK 74074	X	X	--
Panhandle Area Educational Cooperative (PAEC) 411 West Boulevard, South Chipley, FL 32428	X	--	--
Prentice Hall Publishers 200 Old Tappan Rd. Old Tappan, NJ 07675	X	--	--
Superintendent of Documents Government Printing Office (GPO) 710 N. 4th Street, N.W. Washington, DC 20401	X	--	--
St. Johns River Water Management District P. O. Box 1429 Palatka, FL 32078-1429	X	--	--
Service Training Department Deere & Company John Deere Road Moline, IL 61265	X	--	--
Society of American Foresters 5400 Grosvenor Lane Bethesda, MD 20014	X	--	--
Soil and Water Conservation Society 7515 Northeast Ankeny Road Ankeny, IA 50021-9764	X	--	--
Soil Conservation Service U.S. Dept. of Agriculture P.O. Box 2890 Washington, DC 20013	X	--	--

	Print	Audiovisual	Software
South Florida Water Management District P.O. Box V West Palm Beach, FL 33402-9958	X	--	--
Southwest Florida Water Management District 2379 Broad Street Brooksville, FL 34609-6899	X	--	--
Suwannee River Water Management District Route 3, Box 64 Live Oak, FL 32060	X	--	--
U.S. Fish and Wildlife Service Department of the Interior 18th and C Streets, N.W. Washington, DC 20240	X	--	--
Vocational Education Productions California Polytechnic State U. San Luis Obispo, CA 93407	X	X	--
V-TECS Curriculum Publications Clearinghouse Western Illinois University Horrabin Hall 46 Macomb, IL 61455	X	--	--
W. H. Freeman 4419 W. 1980, S. Salt Lake City, UT 84104	X	--	--
Wildlife Management Institute 1412 16th Street, N.W. 1101 14th Street, N.W. Washington, DC 20005	X	--	--
World Wildlife Fund P.O. Box 4866 Hampden Post Office Baltimore, MD 21211	X	--	--

FEIS Services

FLORIDA EDUCATIONAL INFORMATION SERVICE
2003 Apalachee Parkway
Tallahassee, FL 32301
(904) 487-2054

If you need (1) information about copyright; (2) a list of instructors teaching Natural Resources and Forest Ecology programs in Florida; (3) journal articles or project reports on specific topics; (4) curriculum and instructional materials; (5) information on current trends, issues, and research, please contact the Florida Educational Information Service (FEIS), Center for Instructional Development and Services, College of Education, Florida State University, 2003 Apalachee Parkway, Tallahassee, Florida 32301, (904) 487-2054. FEIS will tailor its services to meet your needs for information about resource materials.

APPENDIX A

Sample Teaching-Learning Plans for
Natural Resources and Forest Ecology

Agriculture Enhancement Teaching-Learning Plans

Teaching-learning plans are designed for teacher use in managing instruction. Through the pilot project for the enhancement of vocational agriculture education, teaching-learning plans were developed for each Student Performance Standard in this program. These plans include the appropriate Intended Outcome and Student Performance Standard (SPS); the enabling objectives that clarify what students will know or be able to do; the equipment, tools, and materials needed to teach the SPS, suggested references and texts: teaching and learning activities for the classroom and the laboratory; and three sample test items. These materials are available through the occupational program specialist at DVACE.

Program Title: Natural Resources and Forest Ecology

Course Title: Forest Ecosystems

Intended Outcome: 14.0 Read and interpret aerial photographs and maps.

Student Performance Standard: 14.04 Interpret legal descriptions, for, land in Florida.

Enabling Objectives

Plot/sketch acreage from given land description.
Write sample legal description for given plot of land.

Equipment/Tools/Materials Needed

graph paper, ruler
Introduction to Forestry (Florida, FFS) (available form PAEC, Chipley, FL)
sample plot maps (county clerk, lawyers, tax appraiser, etc.) plat books (county chamber of commerce, development councils, SCS, etc.)

Teaching-Learning Activities (Classroom or Lab)

1. Students determine distance from Tallahassee for a given parcel of land by using legal description.
2. Students sketch home farm or other land plot from given legal description.
3. For given sketch, students write complete legal description.
4. Discuss why a deed has "more or less" when referring to acreage.
5. Locate and visit permanent sectional corner markers. If available, compare with original surveyors' field notes.

Note: Small acreage, i.e., less than 10 acres, is often difficult for beginning students to work with.

Sample Test Item or Performance Checklist

1. A legal description must contain ___, township and range.

   A. quarter
   B. acres
   C. section*
   D. latitude

2. The starting point for all legal descriptions in Florida is ____.

   A. Tallahassee*
   B. Orlando
   C. Gainesville
   D. Key West

3. The NW1/4 of the SW1/4 of section 12 would contain __ acres.

   A. 640
   B. 40*
   C. 80
   D. 160

Program Title: Natural Resources and Forest Ecology

Course Title: Forest Ecosystems

Intended Outcome: 16.0 Assist in determining the quality and quantity of water resources.

Student Performance Standard: 16.01 Identify the hydrologic cycle and major uses of water.

Enabling Objectives

Identify the components of the hydrologic cycle in nature.
Identify the major users of water.

Equipment/Tools/Materials Needed

poster board, plastic bags, and evaporation pan
Managing Our Natural Resources (Delmar, 1988), chapter 10
Water Resources Atlas of Florida (FSU)
soil survey maps (county-SCS)

Teaching-Learning Activities (Classroom or Lab)

1. Students prepare poster showing major components of hydrologic cycle in nature.
2. Inventory major water resources of local area. Students may use Water Atlas, Soil Surveys (County) or resource person, i.e., SCS County Extension Agent, Game/Fish Commission, etc.
3. Students estimate transpiration for selected trees by tying plastic bag to limb with leaves. Measure condensation after 24 hours. Count number of leaves in sample area. Estimate leaves on tree. Determine transpiration for entire tree. **Note: Use weight, i.e., rock, etc., in bag so condensation settles in one spot.**
4. Students determine open-pan evaporation for several days. Note varying daily rates due to weather changes.
5. Students compare percolation rates through different soil textures. Use lamp globes sections of PVC pipe, etc. Add given amount of water. Measure volume of water traveling through soil in equal amounts of time.
6. Students inventory the water use by their family in an average 24-hour period.
7. Prepare list of major users of water in local area. Have students rank the users in priority order of importance. Compare students' rankings. Discuss why there might be different rankings.

Sample Test Item or Performance Checklist

1. Hydrologic cycle refers to the natural cycle for ___.

   A. electricity
   B. water*
   C. oxygen
   D. carbon

2. The downward movement of water in the soil profile is called ___.

   A. percolation*
   B. precipitation
   C. evaporation
   D. water table

3. Which of the following is a major user of water in the US?

   A. agriculture*
   B. strip mining
   C. auto manufacturing
   D. textile manufacturing

Program Title: Natural Resources and Forest Ecology

Course Title: Forestry and Natural Resources

Intended Outcome: 19.00 Assist in managing wildlife population, growth, and reproduction.

Student Performance Standard: 19.02 Identify species of land and aquatic wildlife common to Florida and classify them as game, nongame, endangered, or threatened.

Enabling Objectives

Identify and classify land animals.
Identify and classify aquatic animals.

Equipment/Tools/Materials Needed

Managing our Natural Resources, (Delmar, 1988), chapter 20
wildlife posters and publications from the Game and Fresh Water Fish Commission
VCR tapes or slides on endangered species
hunter-education materials (free from GFC education officer)

Teaching-Learning Activities (Classroom or Lab)

1. Discuss the difference between game and nongame animals.
2. Discuss the difference between threatened and endangered animals.
3. Students prepare list of common species of game animals.
4. Students prepare list of endangered animals in Florida.
5. Student prepare list of advantages of harvesting game animals.
6. From given list of animals, students identify the endangered animals.
7. Students prepare list of animals observed around home, lab plot, or a field trip to park, etc.
8. Maintain small aquarium with selected species of aquatic animals (contact GFC for applicable regulations).
9. For a given endangered species students will identify factors that caused the decline in population.

Sample Test Items or Performance Checklist

1. Which of the following is a game animal in Florida?

   A. key deer
   B. bald eagle
   C. Florida panther
   D. white tail deer*

2. Which of the following is an endangered animal?

   A. whooping crane*
   B. mockingbird
   C. turkey buzzard
   D. house wren

3. Which of the following is a major threat to the Florida panther population?

   A. den destruction
   B. loss of habitat*
   C. hunting pressure
   D. polluted water

Program Title: Natural Resources and Forest Ecology

Course Title: Forestry and Natural Resources

Intended Outcome: 22.00 Assist in managing forest pests.

Student Performance Standard: 22.02 Assist with control of common pests.

Enabling Objectives

Identify control measures.
Select control measures.
Apply control measures.

Equipment/Tools/Materials Needed

tractor or hand sprayer, diesel fuel, chemicals, wound protectant, pruning saws, and knife
Forest and Forestry (interstate) chapter 14
Introduction to Forestry in Florida (FFA), chapter 6
Managing Our Natural Resources (Delmar, 1988), chapter 17
Insects and Diseases (FFA), Bu. #196-A
Insects and Diseases of Trees in the South (USDA), R-8-GR-5 1985

Teaching-Learning Activities (Classroom or Lab)

1. Students visit forested area and identify insect and disease damage.
2. Students determine alternative controls for pest identified and recommend control(s).
3. Students identify other management problems in addition to insects and diseases, i.e., grazing, mechanical injury, weather, etc.
4. Students apply mechanical control for pest, such as individual tree treatment for fusiform rust (FFS circular).
5. Students mix and apply chemicals for control of common pest.
6. Students properly prune limbs and apply protectant.
7. Students prepare list of special pest and management problems particular to urban forest and/or trees, i.e., small root area, backfilling, traffic compactions, etc.
8. Students recommend precautions needed with trees in urban areas.

Sample Test Item or Performance Checklist

1. The study of insects is called ____.

   A. pathology
   B. entomology*
   C. biology
   D. bugology

2. The control for this pest is not to replant pine seedlings immediately behind a clearcut operation. The pest is _____.

   A. reproduction weevil*
   B. black turpentine beetle
   C. pine sawfly
   D. pine tip moth

3. Brownspot needle blight in long leaf pines can be controlled best by ___.

   A. rotation of species
   B. chemicals
   C. cultivation
   D. control burning*

APPENDIX B

Sample Student Learning Guide for
Natural Resources and Forest Ecology

ABOUT STUDENT LEARNING GUIDES

As mentioned in the Instructional Approach section of the *Florida Vocational Education Program Implementation Guide,* competency-based vocational instruction (CBVI) is the most appropriate instructional approach to teaching students to become competent workers. In order to implement CBVI effectively and efficiently, you and the students should have access to competency-based instructional materials, such as student guides.

The following components are often included in a student learning guide:

The **introduction** includes the intended outcome, the SPS for which the guide is developed, and an introduction to the guide, stating why this topic is important to study and what this guide is about (other information, such as the relationship between this guide and other guides, can be included on this sheet also).

Objectives include both knowledge and performance objectives if the SPS calls for hands-on performance, but only knowledge objectives if the SPS requires knowledge-oriented competencies.

Resources include the instructional materials that students should study and the tools and supplies that students should have access to in order to complete this guide.

Learning activities include a list of steps that students should follow in order to master the objectives.

The **self-check** consists of questions designed to help students review.

The **activity sheet** is designed to help students practice hands-on tasks for performance objectives. (If the SPS does not require hands-on activity, this sheet is not included in the learning guide.)

Information sheets provide information, guidance, or summaries not available elsewhere. These are usually instructional resources for the knowlege objectives.

The **written test** measures student achievement on the knowledge objectives.

The **performance test** is designed to be used by the evaluator/instructor to assess the student's level of achievement on the performance objectives.

The student learning guide may consist of two or more sets of the above components if the objectives need to be divided into two or more groups. Whatever format you use for the student learning guide, these components should be included in order to provide for instructional events such as gaining attention, stating objectives, recalling prerequisites, providing instructional stimulus, providing learning guidance, eliciting performance, providing feedback, assessing performance, and enhancing retention and transfer.

STUDENT LEARNING PACKAGE NO.

Horticulture Department
Sarasota County Vocational Center
4748 Beneva Road/Sarasota, Fl da 33583
(813) 924-1365

CORE

Horticulture

DUTY NO. 0600
TASK NO. 0601

PROGRAM NO. CORE

PREREQUISITE

AVERAGE HOURS

DATES REVISED 1988

When you successfully **complete** this learning package, you will be able to:

TASK: INTERPRET INFORMATION IN A PESTICIDE LABEL

Why is it **important** for you to learn this task?

INTRODUCTION:

ANYONE USING PESTICIDES HAS THE RESPONSIBILITY TO HIMSELF OR HERSELF, AND TO OTHERS, TO FOLLOW PROCEDURES THAT AVOID UNNECESSARY HAZARDS TO PEOPLE, ANIMALS, OR THE ENVIRONMENT. IT IS SPECIALLY IMPORTANT THAT REGULAR USERS OF PESTICIDES BE WELL INFORMED AND FOLLOW APPROVED PRACTICES TO AVOID THE CUMULATIVE EFFECT OF LOW-LEVEL CONTAMINATION.

To show that you have **Mastered** this task, here is what you will be asked to do:

PERFORMANCE OBJECTIVE:

You Will Be Given: INSTRUCTION SHEETS, REFERENCE SLIDES AND PESTICIDE LABELS

You Must: DESCRIBE PESTICIDE FORMULATIONS AND INTERPRET PESTICIDE LABEL INFORMATION

How well: MINIMUM GRADE OF 80% IN KNOWLEDGE AND PERFORMANCE TESTS.

Here is what you will be able to do when you complete each **Section** of this learning package:

SECTIONS:

1. DESCRIBE PESTICIDE FORMULATIONS
2. INTERPRET INFORMATION IN PESTICIDE LABEL

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BEST COPY AVAILABLE

SECTION NO.	When you complete this Section, you will be able to: 1. DESCRIBE PESTICIDE FORMULATIONS 2. INTERPRET INFORMATION IN PESTICIDE LABEL

Complete each of the Learning Activities listed below

LEARNING ACTIVITIES

DO the following things:	USE the following resources
1. Read and study instruction sheet	1. SCVC Instruction Sheet No. 1 "PESTICIDE FORMULATIONS"
2. Read reference	2. "APPLYING PESTICIDES CORRECTLY. A guide for Private and Commercial Applicators", pages 23-28
3. Complete self check and turn it in	3. Self Check No. 1 "DESCRIBE PESTICIDE FORMULATIONS"
4. Read and study instruction sheet	4. SCVC Instruction Sheet No. 2 "INTERPRETING INFORMATION IN A PESTICIDE LABEL"
5. View slides	5. Slides/script set No. 206 "THE PESTICIDE LABEL"
6. Complete self check and turn it in	6. Self Check No. 2 "INTERPRET INFORMATION IN LABE
7. Take Performance Test	7. Performance Test No. 1 "INTERPRET INFORMATION IN A PESTICIDE LABEL"

Prog.	Duty	Task	Page
CORE	06.00	0601	2

INSTRUCTION SHEET :

PESTICIDE FORMULATIONS

The main reference for this module is the publication APPLYING PESTICIDES CORRECTLY, A GUIDE FOR PRIVATE AND COMMERCIAL APPLICATORS. The subject of pesticide formulations is covered in pages 23 to 28. The notes in this instruction sheet are to supplement the reference listed. Check pages 126 to 128 of the reference for the meaning of terms used in pest control.

An emulsion is a mixture of two liquids, such as oil and water. Since normally oil and water separate, in order to maintain these two liquids mixed, the oil must be in such small drops that they will not float. Products known as emulsifiers cause the oil to break down in such small drops. So emulsions consist of a mixture of 3 products: water, oil and an emulsifier.

An emulsifiable concentrate is a concentrated product that will turn into an emulsion when mixed with water. Emulsifiable concentrates are oils in which a pesticide has been dissolved and an emulsifer has been added. The initials E or EC are used to indicate that the product is an emulsifiable concentrate. A number added to the initials indicates pounds of pesticide contained in one gallon of emulsifiable concentrate. Malathion 2 EC, means that 2 lbs of malathion are contained in 1 gallon of the emulsifiable concentrate.

Wettable powders are pesticide formulations frequently used. These carry the initials WP or W. Wettable powders are supposed to be mixed with water and applied as a spray. A type of detergent or wetting agent is added to the powder to facilitate the mixing. It is important to keep in mind that the powder does not dissolve in the water; making a solution such as sugar and water will do. The mixture of powder and water make a suspension, such as the muddy water made by mixing soil and water. Suspensions need to be stirred often to keep the powder from settling. Dusts are dry formulations that are intended for use as they come in the container without dilution. The active ingredient contained in the dust has already been diluted by mixing it with an inert powder such as talcum.

Let us compare SEVIN D 5% with SEVIN WP 50%. The wettable powder has a concentration of active ingredient 10 times stronger than the dust, because the wettable powder is supposed to be diluted with water. The dust is ready to apply as it comes. Never apply wettable powders as a dry dust to plants; it will be an extremely high rate of pesticide application.

Phytotoxicity refers to the toxic action of a pesticide on a plant. Emulsifiable concentrates are more likely to be phytotoxic than wettable powders. Wettable powders contain in addition to the pesticide: talcum and wetting agents. These two products are not likely to be phytotoxic.

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INSTRUCTION SHEET 1 (continued)

However, emulsifiable concentrates contain in addition to the pesticide: oil and an emulsifer. Both of these products tend to be phytotoxic. Keep in mind the greater risk of phytotoxity when emulsifiable concentrates are used.

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SELF-CHECK NO. :

DIRECTIONS:

Information needed to answer these questions is in the reference APPLYING PESTICIDES CORRECTLY, A GUIDE FOR PRIVATE AND COMMERCIAL APPLICATORS, pages 23 to 28 and pages 125 to 128. Use also Instruction Sheet No. 1.

1. Which formulations are represented by the following initials?

INITIALS	TYPE OF FORMULATION
EC	
G	
D	
P	
WP	
B	
S	
ULV	

2. How much Malathion is contained in 1 gallon of Malathion EC 4?

   A. 4%
   B. 4 ounces
   C. 4 pints
   D. 4 pounds

3. Which formulation requires no mixing?

   A. soluble powder
   B. Ultra low volume
   C. soluble powder
   D. dust

4. What is a pesticide formulation?

   A. the concentration of a poison
   B. the product that kills pests

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SELF-CHECK NO. : (continued)

4. (continued)

   C. the formula of the material considered to be the active ingredient

   D. the mixture of active and inactive ingredients

5. Which formulation is mixed with water?

   A. Baits
   C. Granules
   B. Dusts
   D. Wettable powders

6. Which formulation of a given pesticide is most phytotoxic?

   A. EC is more phytotoxic then WP

   B. WP is more phytotoxic than EC

   C. EC and WP are equally phytotoxic

7. Which formulation requires most agitation while it is being applied?

   A. S
   C. EC
   B. WP
   D. SP

8. Which formulation represents the greatest hazard for the applicator?

   A. Dust
   C. Emulsifiable concentrate
   B. Granules
   D. Fumigant

9. Which formulation has the lowest concentration of active ingredient?

   A. Dust
   C. Ultra low volume
   B. Wettable powder
   D. Emulsifiable concentrate

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SELF-CHECK NO. : (continued)

10. Which formulation will have the least risk of drift?

A. Dust
B. Emulsifiable concentrate
C. Granules
D. Fumigant

11. Which formulation is used in seed treatment?

A. WP
B. B
C. D
D. EC

12. Which formulation is used for soil applications?

A. G
B. WP
C. D
D. EC

13. Which formulation is used for control of slugs?

A. D
B. EC
C. WP
D. B

14. Which formulation will not be adequate for foliage application?

A. EC
B. G
C. D
D. WP

15. A small airplane is to be used over a swamp applying pesticide to control mosquitoes. Select the formulation that will weigh the least?

A. D
B. EC
C. ULV
D. WP

16. Which type of formulation is most phytotoxic?

A. Dust
B. Wettable
B. Emulsifiable concentrate
C. Granules

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INSTRUCTION SHEET No. 2

INTERPRETING INFORMATION ON A PESTICIDE LABEL

The label on a pesticide container is a legal document. You must follow its instructions or you are subject to either civil or criminal penalties. Failure to follow label instructions when using a pesticide is a violation of the law.

Read the label carefully before you buy the pesticide. Read it again before mixing, applying pesticides, and again before storing or disposing of pesticides. Follow label instructions carefully to use the pesticide safely and correctly.

The examination required to obtain a Private Pesticide Applicators License is based on information contained in the publication: APPLYING PESTICIDES CORRECTLY, A GUIDE FOR PRIVATE AND COMMERCIAL APPLICATORS. The chapter LABELS AND LABELING, pages 29 to 35, of this publication is the main reference for this module. As you read this chapter find the answers for Self Check No. 2.

On pages 125 to 128 you will find the meaning of many terms used in pest control.

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SELF-CHECK NO. :

DIRECTIONS:

USE THE INFORMATION CONTAINED IN THIS PESTICIDE LABEL TO ANSWER QUESTIONS IN SELF CHECK NO. 2

Pramitol®

80 WP

SAMPLE LABEL

Herbicide

For weed control on railroad rights-of-way and industrial sites

Controls johnsongrass, bindweed and other hard-to-kill weeds

25 Pounds
Net Weight

Active Ingredient:

Prometon: 2,4-bis (isopropylamino)-6-methoxy-s-triazine	80%
Inert Ingredients:	20%
Total:	100%

EPA Est. No. 100-AL-1
EPA Reg. No. 100-536-ZA
Control No. 50590

Pramitol 80WP is a wettable powder.

Warning:
Keep out of reach of children.

See additional warning statements on back of bag.

CIBA–GEIGY

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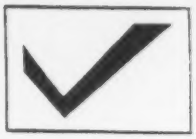
SELF-CHECK NO. 2 (continued)



DIRECTIONS FOR USE AND CONDITIONS OF SALE AND WARRANTY

IMPORTANT: Read the entire Directions for Use and the Conditions of Sale and Warranty before using this product.

Conditions of Sale and Warranty

The Directions for Use of this product reflect the opinion of experts based on field use and tests. The directions are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials or the manner of use or application, all of which are beyond the control of CIBA-GEIGY or the Seller. All such risks shall be assumed by the Buyer.

CIBA-GEIGY warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes referred to in the Directions for Use, subject to the inherent risks referred to above. **CIBA-GEIGY makes no other express or implied warranty of Fitness or Merchantability or any other express or implied warranty. In no case shall CIBA-GEIGY or the Seller be liable for consequential, special, or indirect damages resulting from the use or handling of this product.** CIBA-GEIGY and the Seller offer this product and the Buyer and user accept it, subject to the foregoing Conditions of Sale and Warranty which may be varied only by agreement in writing signed by a duly authorized representative of CIBA-GEIGY.

General Information

Pramitol 80WP is a nonselective herbicide that may be applied in water or phytotoxic oil before or after plant growth begins. When applied with water as the carrier, Pramitol 80WP has minimal activity through foliar contact. Much of its activity is through plant roots; therefore, its effectiveness is dependent on rainfall to move it into the root zone. Very dry soil conditions and lack of sufficient rainfall may result in poor weed control.

Use only in areas where complete control of all vegetation is desired, such as industrial sites, rights-of-way, lumberyards, petroleum tank farms, around farm buildings, along fence lines, etc. When applied to the soil, this product usually inhibits plant growth for a year or more. Pramitol 80WP should not be used on land to be cropped, or near adjacent desirable trees, shrubs or plants, or injury may occur.

Pramitol 80WP is noncorrosive to equipment and metal surfaces, nonflammable, and has low electrical conductivity.

Mixing Instructions

Pramitol 80WP is a wettable powder that should be mixed with water or phytotoxic oil and applied as a spray. Make a slurry by adding Pramitol 80WP to water or phytotoxic oil. Pour the slurry into the spray tank during or after filling. Sufficient hydraulic (jet) or mechanical agitation must be provided during mixing and application to keep the material in suspension. Wash sprayer thoroughly after use.

Directions for Use

Industrial Sites and Noncrop Areas

Apply Pramitol 80WP prior to or up to 3 months after weed emergence. Application rates vary from 12½-74 lbs. of Pramitol 80WP per acre, depending on climatic conditions, soil conditions, weeds present and the stage of growth of the weeds. In the following rate recommendations, the higher rates are intended for use on heavier soils where weed growth is heavy and where rainfall is expected to be relatively high. Use the higher rates also where longer residual control is desired in regions with a long growing season.

For best results, apply Pramitol 80WP prior to weed emergence or when weeds are young and actively growing.

For control of annual and susceptible perennial weeds including downy bromegrass, oatgrass, goosegrass, quackgrass, puncturevine, goldenrod and plantain: Broadcast 12½-18½ lbs. Pramitol 80WP in 50-100 gals. of water per acre. For small areas, apply 4½-6¾ oz. Pramitol 80WP per 1,000 sq. ft. in sufficient water to give thorough and uniform coverage.

For control of hard-to-kill perennial weeds and grasses including johnsongrass, bindweed and wild carrot: Broadcast 50-74 lbs. Pramitol 80WP in 50-100 gals. of water per acre. For small areas, use 1 lb. 2 oz.-1 lb. 11 oz. Pramitol 80WP per 1,000 sq. ft. in sufficient water to give thorough and uniform coverage.

For faster top-kill of existing vegetation, apply Pramitol 80WP in diesel oil, fuel oil or weed oil. Use 100-200 gals. of oil per acre. Tall dense vegetation including johnsongrass will generally require a minimum of 150 gals. of oil per acre for thorough coverage.

Under Asphalt Pavement

Pramitol 80WP may be used to extend the useful life of asphalt pavement by preventing weeds from emerging through it. Pramitol 80WP may be applied to the ground before laying asphalt.

Pramitol 80WP should be used only where the area to be treated has been prepared according to good construction practices. The site should be disked, plowed or otherwise prepared in accordance with good construction practices and recompacted to allow good penetration of the Pramitol 80WP mixture.

Pramitol 80WP does not control woody vegetation such as small trees, brush and woody vines. Roots of such species should be grubbed and removed from the site prior to application. If rhizomes, tubers or other vegetative parts are present in the site they should be removed by scalping with a grader blade.

Pramitol 80WP may be applied to the ground before laying rapid, medium or slow curing asphalt coatings such as those used in parking lots, highway shoulders and median strips, roadways and other industrial sites. Pramitol 80WP should be applied just prior to the laying of the asphalt coating to prevent possible lateral movement of the herbicide by rainfall or other mechanical means. Sprayers should be equipped to provide continuous agitation of the spray mixture during application to ensure application of a uniform spray emulsion.

Apply Pramitol 80WP uniformly at the rate of 50-62 lbs. per acre (0.16-0.20 oz. per sq. yd.) in a minimum of 100 gals. of water. Use the lower rate to control annual and susceptible perennial weeds including downy bromegrass, oatgrass, goosegrass, quackgrass, puncturevine, goldenrod and plantain; use the higher rate to control hard-to-kill perennial weeds and grasses including johnsongrass, bindweed and wild carrot.

Precaution: Do not use Pramitol 80WP under asphalt coatings less than 3 inches thick.

Warning

Keep out of reach of children.

Causes eye irritation. Avoid contact with eyes. Wash thoroughly after handling. Harmful if swallowed. Avoid contact with skin, inhalation of dust, and contamination of food and feed.

Do not contaminate water used for irrigation or domestic purposes.

Do not contaminate water by cleaning of equipment or disposal of wastes. Apply this product only as specified on this label.

Do not use for weed control in greenhouses.

Do not reuse container. Destroy when empty.

Pramitol: trademark of CIBA-GEIGY for prometon.
U.S. Patent No. 2,909,420

Agricultural Division
CIBA-GEIGY Corporation
Greensboro, North Carolina 27409
CGA 4462

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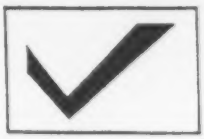
SELF-CHECK NO. 3



DIRECTIONS:

Use the resources listed in this module to answer the following questions regarding the pesticide label enclosed.

1. What is the brand name of this pesticide?

2. What is the common name of this pesticide?

3. What is the chemical name of this pesticide?

4. What is the type of formulation of this pesticide?

5. What is the signal word of this pesticide?

6. How many pounds of active ingredient are contained in one bag of this pesticide?

7. Is this pesticide supposed to be applied directly to plants as it comes in the container?

8. What does this pesticide control?

9. Is it recommended that this pesticide be used in the greenhouse?

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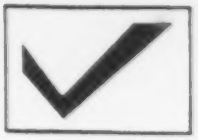

10. What precautions does the applicator need to observe to avoid contamination?

11. Is this pesticide flammable?

12. Is this pesticide most effective through plant foliage or through plant roots?

13. Approximately how long is the residual activity of this pesticide?

14. Will this pesticide corrode metal surfaces?

15. Name two carriers (solvents) that can be mixed with this pesticide when applying it.

16. Describe 2 situations in which the use of this pesticide will be indicated.

17. Describe situations in which the use of this pesticide will not be advisable.

18. What company manufactures this pesticide?

19. After reading this label what means of protection would you use when mixing and applying this pesticide?

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State of Florida
Department of Education
Tallahassee, Florida
Betty Castor, Commissioner
Affirmative action/equal opportunity employer

Division of Vocational, Adult, and Community Education

DVACE/07/91/250 12345789/91 AG 413 BK 91

CAREER MERIT ACHIEVEMENT PLAN (CAREER MAP)

NATURAL RESOURCES AND FOREST ECOLOGY

(8118200)
(0103.059901CP)

STUDENT'S NAME

State of Florida

An affirmative action/equal opportunity employer

DEPARTMENT OF EDUCATION
Betty Castor, Commissioner

DIVISION OF VOCATIONAL, ADULT, AND COMMUNITY EDUCATION
Robert S. Howell, Director

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FOR FURTHER INFORMATION, CONTACT

Bureau of Vocational Program and Staff Development
Division of Vocational, Adult, and Community Education
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Student's ID Number _____

Student's Address _____

_____

Instructor's Name _____ **Initials** _____

School _____

_____

Date Started _____

PRIMARY JOB TITLES FOR THIS INSTRUCTIONAL PROGRAM

- Biological Aide (DOT #049.384-010)
- Cruiser (DOT #459.387-010)
- Fish Hatchery Worker (DOT #446-684-010)
- Forest and Conservation Worker (OES #79002513)
- Forest Conservation Worker (OES #80002831)
- Forester Aide (DOT #452.364-010)
- Forest Worker (DOT #452.687-010)
- Soil Conservation Aide (DOT #040.061-054)
- Surveyor Helper (DOT #869.567-010)
- Tree Planter (DOT #452.687-018)
- Wildlife Conservation Aide, Park Ranger (DOT #169.167-042)

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OVERVIEW

This Career MAP includes the competencies required for entry into the work force as a natural resources and forest ecology worker. Business and industry representatives have recommended that students in this field master these competencies in order to become employable. Local education agencies (LEAs) may adapt these competencies to meet their work-force needs.

Purposes of the MAP

The purposes of the MAP are to display the student performance standards (SPSs) required by the LEA and to document the level of achievement on SPSs that the student demonstrates.

How to Use the MAP

Administrator and Instructor. The administrator and instructor can use Career MAPs in curriculum planning, program updating and improvement, and teacher recruitment, selection, and updating. If the LEA changes or adds SPSs, the revised or additional SPSs should be included in the blank boxes that appear within each intended outcome or at the end of this MAP.

Instructor. The instructor can use Career MAPs to keep track of student progress on SPSs. By periodically reviewing the ratings on standards, the instructor can identify a student's strengths and weaknesses and on that basis identify the skills for which the student needs remedial instruction or advanced training. MAPs can also be useful in student counseling and evaluation.

Co-op Instructor/Employer. The employer who sponsors a co-op program should use the Career MAP for keeping a record of the student's performance on appropriate standards. The MAPs will also help the co-op instructor/employer in counseling and evaluating the student.

Student. The student may use the MAP to show potential employers the performance standards he or she has mastered. In order to present a complete record, the student should encourage the co-op instructor/employer to rate his or her level of achievement on all the appropriate SPSs and to fill in the verification form in the back of this MAP.

Employer. The MAP shows an employer the SPSs mastered by the student (a prospective employee) and the proficiency level achieved on each one. This information can help the employer make decisions about hiring, job assignments, and job-training needs.

Rating Student Performance

Performance Competencies. Ratings on SPSs should be based upon business/industrial performance standards. The evaluator observes and evaluates student performance as he or she would in the role of the employer or supervisor.

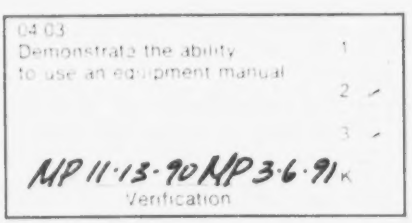
For each skill listed, the learner receives a rating of 1, 2, or 3. Each rating indicates a particular level of achievement:

1 = Learner demonstrates knowledge and understanding of this SPS, but is not yet able to apply that knowledge or understanding.

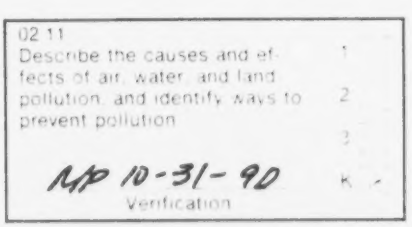
2 = Learner performs this SPS satisfactorily with only periodic supervision.

3 = Learner performs this SPS satisfactorily without supervision.

Whenever a performance standard is demonstrated, the instructor checks the appropriate rating box (1, 2, or 3) and initials and dates the verification line. If the student later demonstrates a higher level of achievement on a performance competency, the instructor checks the higher level and then enters his or her initials and the new date on the verification line, as shown in the following example:



Knowledge Competencies. For each SPS that is a knowledge competency only, with no manipulative skill involved, only one level of achievement is possible. If the student masters the competency, he or she receives a check in the bottom box ("K"), as shown below:



NOTE: An SPS without a checked rating indicates that the learner has not mastered the standard from lack of ability, time, opportunity, or need (the student's area of specialization may not have required it).

01.0 DESCRIBE THE SOCIOECONOMIC ROLE OF AGRICULTURE.

01.01 Prepare an overview of the history of agriculture. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	01.02 Discuss agricultural products and services important to the local, state, national, and global economy. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	01.03 Investigate career opportunities in agriscience, and identify which school activities would help one prepare for those careers. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
01.04 Discuss agriculture's role in the interaction of population, food, and energy. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

02.0 APPLY IMPORTANT SCIENTIFIC AND TECHNOLOGICAL PRINCIPLES TO AGRIBUSINESS AND NATURAL RESOURCES.

02.01 Discuss the importance of scientific classification in agriculture. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	02.02 Use scientific methods to solve problems in agriculture. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	02.03 Demonstrate the use of genetics, including probability applications, through an agricultural project/activity. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
02.04 Analyze how recent technology is impacting agriscience. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	02.05 Identify the components of an agricultural ecosystem, and recognize the role of each. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	02.06 Construct and analyze a diagram of a biological food chain common to Florida agriculture and natural resources. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
02.07 Describe how water, carbon, nitrogen, oxygen, sulfur, and phosphorus are recycled naturally. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	02.08 Evaluate soil profiles, land-capability classes, and soil-conservation practices. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	02.09 List the components of Florida's freshwater systems (lakes, groundwater, aquifer, sinkholes, rivers, and swamps), and explain the importance of managing these resources. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification

NATURAL RESOURCES AND FOREST ECOLOGY

02.10 Explain how increasing or decreasing the use of one natural resource may affect another resource. 1 2 3 K Verification	02.11 Describe the causes and effects of air, water, and land pollution, and identify ways to prevent pollution. 1 2 3 K Verification	02.12 Explain the flow of energy from the sun, through agricultural systems (i.e., the common food pyramid), and back into the abiotic environment. 1 2 3 K Verification
02.13 Recognize the environmental requirements necessary for a productive natural or man-made aquaculture system. 1 2 3 K Verification	02.14 Apply principles of sound waste management to environmental problems common to agricultural systems. 1 2 3 K Verification	1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

03.0 PRACTICE AGRICULTURAL SAFETY.

03.01 List the most common causes of agricultural accidents. 1 2 3 K Verification	03.02 Discuss the importance of following proper safety precautions. 1 2 3 K Verification	03.03 Demonstrate safety procedures in the classroom and laboratory. 1 2 3 K Verification
03.04 Describe the importance of following the directions on chemical containers and in equipment operator manuals. 1 2 3 K Verification	03.05 Recognize the proper procedures of basic first aid and cardiopulmonary resuscitation (CPR). 1 2 3 K Verification	03.06 Demonstrate safe and effective use of laboratory equipment, instruments, and materials. 1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

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04.0 DEMONSTRATE THE USE OF TOOLS AND EQUIPMENT, AND DESCRIBE THE PRINCIPLES OF AGRICULTURAL MECHANICS.

04.01 Describe the importance of using the proper tools and equipment for the job. 1 2 3 K Verification	04.02 Describe the principles of selected mechanical applications (e.g., levers, pulleys, hydraulics, internal combustion). 1 2 3 K Verification	04.03 Demonstrate the ability to use an equipment manual. 1 2 3 K Verification
04.04 Demonstrate the use of selected tools and equipment. 1 2 3 K Verification	04.05 Service, maintain, and store tools, equipment, and supplies. 1 2 3 K Verification	1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

05.0 DESCRIBE THE PRINCIPLES OF PEST MANAGEMENT FOR INSECTS, DISEASES, AND WEEDS.

05.01 Identify major types of pests and weed infestations. 1 2 3 K Verification	05.02 Identify and select an appropriate control for each major type of pest, including the use of Integrated Pest Management. 1 2 3 K Verification	05.03 Describe symptoms of pesticide poisoning. 1 2 3 K Verification
05.04 Extract pertinent information from a pesticide label. 1 2 3 K Verification	05.05 Select, mix, and apply a nonrestricted chemical, according to the label and local, state, federal, and EPA regulations. 1 2 3 K Verification	05.06 Clean and store pesticide application equipment, safety clothing, and safety equipment. 1 2 3 K Verification
05.07 Identify the proper disposal of containers and residual pesticides. 1 2 3 K Verification	05.08 Calibrate spray equipment; solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience. 1 2 3 K Verification	1 2 3 K Verification

1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

06.0 DESCRIBE THE PRINCIPLES OF PLANT GROWTH AND REPRODUCTION.

06.01 Identify the raw materials and products of photosynthesis and respiration, the plant structures involved, and the environmental conditions necessary for each reaction 1 2 3 K Verification	06.02 Describe the functions of roots, stems, leaves, and flowers 1 2 3 K Verification	06.03 Demonstrate sexual and asexual plant propagation 1 2 3 K Verification
06.04 Demonstrate the effects of nitrogen (N), phosphorus (P), and potassium (K) on plant growth 1 2 3 K Verification	06.05 Extract pertinent information from a fertilizer label 1 2 3 K Verification	06.06 Describe the short- and long-range impact of fertilizer on people and the environment 1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

07.0 APPLY MANAGEMENT SKILLS AND ECONOMIC PRINCIPLES TO AGRIBUSINESS AND NATURAL RESOURCES.

07.01 Identify basic economic principles applicable to agribusiness 1 2 3 K Verification	07.02 Explain the importance of local, state, and federal regulations and required documentation affecting agriculture 1 2 3 K Verification	07.03 Describe the types of agribusiness by organizational structure 1 2 3 K Verification
07.04 Select and use computer applications appropriate to agribusiness 1 2 3 K Verification	07.05 Form one or more inferences or hypotheses from records summarized in tables, graphs or pictures 1 2 3 K Verification	07.06 Keep and maintain supervised agricultural experience (SAE) records 1 2 3 K Verification

07.07 Interpret legal descriptions of land in Florida. 1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

08.0 EXPLAIN THE BASIC FUNCTIONS OF THE MARKETING PROCESS IN AGRICULTURE.

08.01 Describe key factors in marketing agricultural products. 1 2 3 K Verification	08.02 Select agricultural products according to grades and standards. 1 2 3 K Verification	1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

09.0 DEMONSTRATE HUMAN-RELATIONS, COMMUNICATIONS, AND LEADERSHIP SKILLS.

09.01 Demonstrate acceptable work habits and attitudes. 1 2 3 K Verification	09.02 Follow oral and written directions with understanding; form questions that clarify directions, as needed. 1 2 3 K Verification	09.03 Communicate effectively in oral, written, visual, and nonverbal modes; demonstrate effective telephone skills. 1 2 3 K Verification
09.04 Recognize and demonstrate reflective listening skills and assertive communications skills in the workplace. 1 2 3 K Verification	09.05 Conduct small, informal group meetings. 1 2 3 K Verification	09.06 Demonstrate a knowledge of the opportunities for leadership development available through an appropriate student organization. 1 2 3 K Verification

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1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

10.0 DESCRIBE THE FORESTRY, NATURAL-RESOURCES, AND ENVIRONMENTAL-PROTECTION INDUSTRIES.

10.01 Identify career opportunities in forestry, natural-resources, and environmental-protection industries and their educational requirements. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	10.02 Describe the importance of forestry, natural resources, and environmental protection. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	10.03 Identify professional organizations and trade journals in the forestry, natural resources, and environmental protection industries. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

11.0 PRACTICE FORESTRY AND NATURAL-RESOURCES SAFETY.

11.01 Identify hazards of the workplace. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	11.02 Observe color-coded warnings in work area and on equipment and machinery. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	11.03 Demonstrate safety procedures. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
11.04 Identify safe and effective fire-extinguishing techniques. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	11.05 Apply minor first-aid treatment and identify emergency procedures. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	11.06 Safely handle and store flammable and nonrestricted chemicals. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
11.07 Select personal safety equipment and appropriate clothing. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	11.08 Operate machinery and equipment according to safety recommendations of manufacturer. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

12.0 OPERATE, MAINTAIN, AND REPAIR MACHINERY, EQUIPMENT, AND FACILITIES.

12.01 Use the equipment operator and repair manuals 1 2 3 K Verification	12.02 Service and maintain small gasoline engines 1 2 3 K Verification	12.03 Operate, service, and maintain tractors and equipment 1 2 3 K Verification
12.04 Maintain records of maintenance and repair of equipment and machinery 1 2 3 K Verification	12.05 Prepare equipment for storage 1 2 3 K Verification	12.06 Demonstrate proper use of shop and lab equipment 1 2 3 K Verification
12.07 Perform minor welding repairs using arc and oxygen acetylene equipment 1 2 3 K Verification	12.08 Repair and maintain facilities 1 2 3 K Verification	12.09 Use two-way radio equipment 1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

13.0 IDENTIFY LAND BOUNDARIES AND PERFORM BASIC SURVEYING OPERATIONS.

13.01 Make linear measurements of land 1 2 3 K Verification	13.02 Set up levels and perform basic surveying operations 1 2 3 K Verification	13.03 Mark boundaries and corners by using paint or by blazing 1 2 3 K Verification

13.04 Calculate area of measured land 1 2 3 K Verification	13.05 Plot land area using legal land description 1 2 3 K Verification	1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

14.0 READ AND INTERPRET AERIAL PHOTOGRAPHS AND MAPS.

14.01 Interpret the terms, symbols and scales used on soil and topographic maps 1 2 3 K Verification	14.02 Use maps and aerial photographs for determining acreage 1 2 3 K Verification	14.03 Use aerial photographs to identify major timber types and land features 1 2 3 K Verification
14.04 Interpret legal descriptions for land in Florida 1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

15.0 IDENTIFY MAJOR ECOSYSTEMS OF FLORIDA.

15.01 Identify common plant and animal species of major ecosystems 1 2 3 K Verification	15.02 Identify habitats of the most endangered plant and animal species in Florida 1 2 3 K Verification	1 2 3 K Verification

1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

16.0 ASSIST IN DETERMINING THE QUALITY AND QUANTITY OF WATER RESOURCES.

16.01 Identify the hydrologic cycle and major uses for water 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	16.02 Assist in identifying present and potential sources of water pollution in the local area 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	16.03 Assist in determining the quality of a given sample of water 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
16.04 Calculate the volume and surface area of ponds, lakes, and streams 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	16.05 Assist in planning the improvements of waterways, ponds, stream banks, and shorelines 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

17.0 ASSIST IN MANAGING PLANT GROWTH AND REPRODUCTION.

17.01 Take soil samples representative of an area, correctly complete soil data forms, and submit them for laboratory analysis 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	17.02 Test soil for acidity or alkalinity, and recommend proper soil additives to correct the pH level 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	17.03 Determine the appropriate conservation management practices for planting a particular area 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
17.04 Determine land capability according to soil classification standards 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	17.05 Select method of land clearing or site preparation 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	17.06 Care for seedling from nursery to planting 1 ☐ 2 ☐ 3 ☐ K ☐ Verification

17.07 Plant tree seedlings, using hand or mechanical planter 1 2 3 K Verification	17.08 Identify methods of production and assist in producing plants 1 2 3 K Verification	17.09 Explain the organic cycle occurring in nature 1 2 3 K Verification
17.10 Explain requirements for the natural regeneration of plant species 1 2 3 K Verification	17.11 Maintain selected plants 1 2 3 K Verification	1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

18.0 IDENTIFY VOLUMES, PRODUCTS, AND MARKETING TECHNIQUES.

18.01 Identify the products made from trees and other natural resources and their value 1 2 3 K Verification	18.02 Select and mark trees to be removed in timber stand improvement 1 2 3 K Verification	18.03 Conduct a simple cruise 1 2 3 K Verification
18.04 Calculate volume and value timber Verification	18.05 Identify components of timber sales contracts 1 2 3 K Verification	18.06 Identify methods of harvesting and erosion prevention Verification
18.07 Determine site quality and growth rate for a timber stand 1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

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19.0 ASSIST IN MANAGING WILDLIFE POPULATION GROWTH AND REPRODUCTION.

19.01
Identify private, state, and federal agencies that are involved in animal wildlife conservation
1 2 3 K
Verification

19.02
Identify species of land and aquatic wildlife common to Florida, and classify them as game, nongame, endangered, or threatened
1 2 3 K
Verification

19.03
Describe the characteristics of wildlife population dynamics
1 2 3 K
Verification

19.04
Conduct a population survey of a wildlife species
1 2 3 K
Verification

19.05
Identify appropriate management practices for wildlife habitat
1 2 3 K
Verification

19.06
Interpret wildlife, game, and fishing laws, rules, and regulations
1 2 3 K
Verification

19.07
Identify pests, insects, and diseases of common wildlife species
1 2 3 K
Verification

1 2 3 K
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20.0 ASSIST IN MANAGING THE URBAN FOREST.

20.01
Assist in properly planting/transplanting trees in the urban landscape
1 2 3 K
Verification

20.02
Demonstrate proper tree pruning, trimming, and fertilization techniques
1 2 3 K
Verification

20.03
Describe the procedure for an urban tree inventory
1 2 3 K
Verification

20.04
Describe the steps in proper selection of trees for planting in urban landscape
1 2 3 K
Verification

20.05
Develop a vegetative plan for improving wildlife habitat in urban areas
1 2 3 K
Verification

1 2 3 K
Verification

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2 ☐
3 ☐
K ☐
Verification

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2 ☐
3 ☐
K ☐
Verification

1 ☐
2 ☐
3 ☐
K ☐
Verification

21.0 ASSIST IN CONTROLLING AND USING FIRE IN FORESTS AND OTHER LANDS.

21.01
Identify major causes of wildfire
1 ☐
2 ☐
3 ☐
K ☐
Verification

21.02
Assist in determining and correcting potential fire danger in forests and other lands
1 ☐
2 ☐
3 ☐
K ☐
Verification

21.03
Describe personal safety procedures for forest fire fighters
1 ☐
2 ☐
3 ☐
K ☐
Verification

21.04
Use swatter, rake, portable water pack, and shovel to fight fire directly and counter fire for indirect attack
1 ☐
2 ☐
3 ☐
K ☐
Verification

21.05
Explain uses of prescribed burning in forest and wildlife management
1 ☐
2 ☐
3 ☐
K ☐
Verification

21.06
Develop a plan for a prescribed burn, including desirable burning conditions, permits, map, and fire lines
1 ☐
2 ☐
3 ☐
K ☐
Verification

21.07
Identify the burning assistance that is available from the Division of Forestry
1 ☐
2 ☐
3 ☐
K ☐
Verification

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Verification

22.0 ASSIST IN MANAGING FOREST PESTS.

22.01
Identify common pests, insects and diseases
1 ☐
2 ☐
3 ☐
K ☐
Verification

22.02
Assist with control of common pests
1 ☐
2 ☐
3 ☐
K ☐
Verification

22.03
Assist with chemical, mechanical, and other controls of weed species
1 ☐
2 ☐
3 ☐
K ☐
Verification

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23.0 IDENTIFY APPLICABLE LOCAL, STATE, AND FEDERAL RULES AND REGULATIONS AND ASSISTANCE PROGRAMS.

23.01 Identify applicable land-use and zoning regulations 1 2 3 K Verification	23.02 Identify agencies affecting land and wildlife utilization (e.g., DNR, DER, EPA) 1 2 3 K Verification	23.03 Identify agencies regulating employee/employer (e.g., OSHA) 1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

24.0 APPLY MULTIUSE PRINCIPLES TO FORESTS AND OTHER LANDS.

24.01 Identify types of ownership of land and ownership rights 1 2 3 K Verification	24.02 Identify legal responsibilities for private and public landowners when land is used by the public 1 2 3 K Verification	24.03 Identify different types of leases and their necessary components 1 2 3 K Verification
24.04 Prepare a complete inventory of the renewable natural resources for a given site 1 2 3 K Verification	24.05 Assist in preparing a multiple-use plan for forests and other lands 1 2 3 K Verification	24.06 Demonstrate safe use and maintenance for common outdoor equipment, including firearms 1 2 3 K Verification
24.07 Interpret park/campground rules, regulations, and historical and natural features for park visitors 1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

25.0 IDENTIFY TECHNOLOGICAL ADVANCES IN THE INDUSTRY.

25.01 Identify and use basic computer programs. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	25.02* Identify satellite surveying operations and laser systems. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	25.03 Identify satellite thermal infrared imagery. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
25.04 Identify computer mapping systems and geographic information systems. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification
1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification	1 ☐ 2 ☐ 3 ☐ K ☐ Verification

26.0 APPLY BUSINESS-MANAGEMENT SKILLS, AND IDENTIFY APPROPRIATE LEGAL DOCUMENTS.

26.01 Complete basic business records. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	26.02 Demonstrate the use of banking procedures. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	26.03 Identify personal/business liability and the use of liability insurance. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification
26.04 Identify applicable insurance requirements. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	26.05 Identify applicable personal/business tax liability. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification	26.06 Complete basic personal/business tax liability forms. 1 ☐ 2 ☐ 3 ☐ K ☐ Verification

26.07 Identify requirements of Greenbelt and Homestead Taxation 1 2 3 K Verification	26.08 Interpret enterprise budgets and amortization tables 1 2 3 K Verification	26.09 Identify characteristics of legal instruments (i.e., contracts, deeds, and leases) 1 2 3 K Verification
26.10 Complete supervised agricultural experience (SAE) records 1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification
1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

27.0 DEMONSTRATE LEADERSHIP, EMPLOYABILITY, COMMUNICATIONS, AND HUMAN-RELATIONS SKILLS.

27.01 Conduct group meetings using parliamentary procedure and public-speaking skills 1 2 3 K Verification	27.02 Identify acceptable work habits (ethics) and desired personal characteristics 1 2 3 K Verification	27.03 Demonstrate acceptable employee-hygiene habits 1 2 3 K Verification
27.04 Secure information about a job 1 2 3 K Verification	27.05 Complete a job application 1 2 3 K Verification	27.06 Demonstrate competence in job-interview techniques 1 2 3 K Verification
27.07 Demonstrate proper office procedures 1 2 3 K Verification	27.08 Demonstrate appropriate response to criticism from employer, supervisor, or other persons in the workplace 1 2 3 K Verification	27.09 Demonstrate how to appropriately make a career change 1 2 3 K Verification
27.10 Demonstrate knowledge of how to appropriately make a career change, including resigning from a job 1 2 3 K Verification	1 2 3 K Verification	1 2 3 K Verification

NATURAL RESOURCES AND FOREST ECOLOGY

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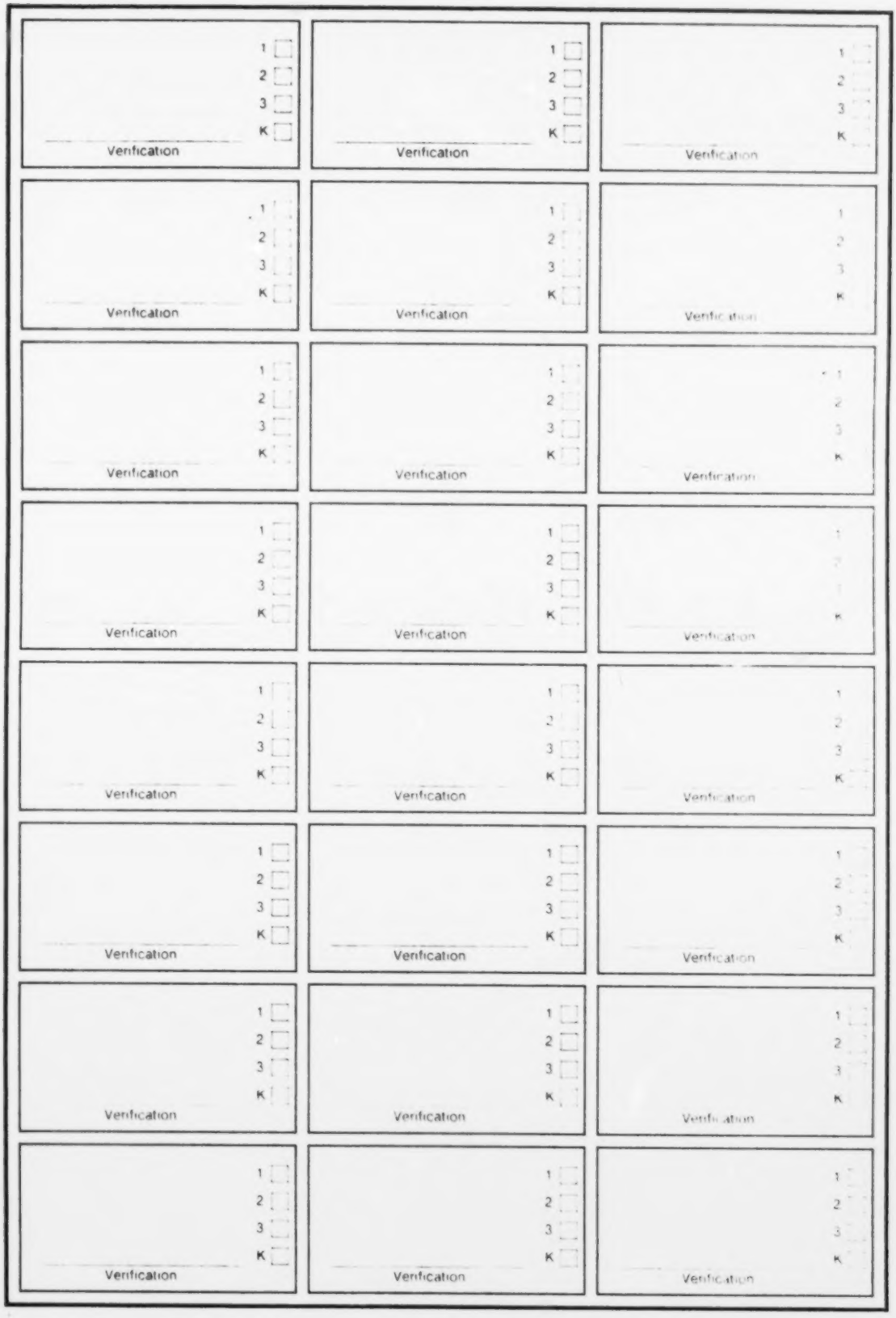
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Verification

VERIFICATION

Each instructor who rates this student on competencies in this MAP should fill in one of the boxes below.

Initials _____ Signature _____

Title _____

School Name _____

School Address _____

Initials _____ Signature _____

Title _____

School Name _____

School Address _____

Initials _____ Signature _____

Title _____

School Name _____

School Address _____

COOPERATIVE WORK EXPERIENCE

In addition to classroom training and laboratory performance identified on the Career MAP, this student has participated in cooperative work experience with employers, as shown below.

Dates _____ Employer _____

Employer's Address _____

Supervisor _____

Supervisor's Title _____

Dates _____ Employer _____

Employer's Address _____

Supervisor _____

Supervisor's Title _____

Dates _____ Employer _____

Employer's Address _____

Supervisor _____

Supervisor's Title _____

NOTES

This section of the MAP is provided for the instructor, employer, or student to list additional qualifying statements or other pertinent information. All comments should be initialed for verification.

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